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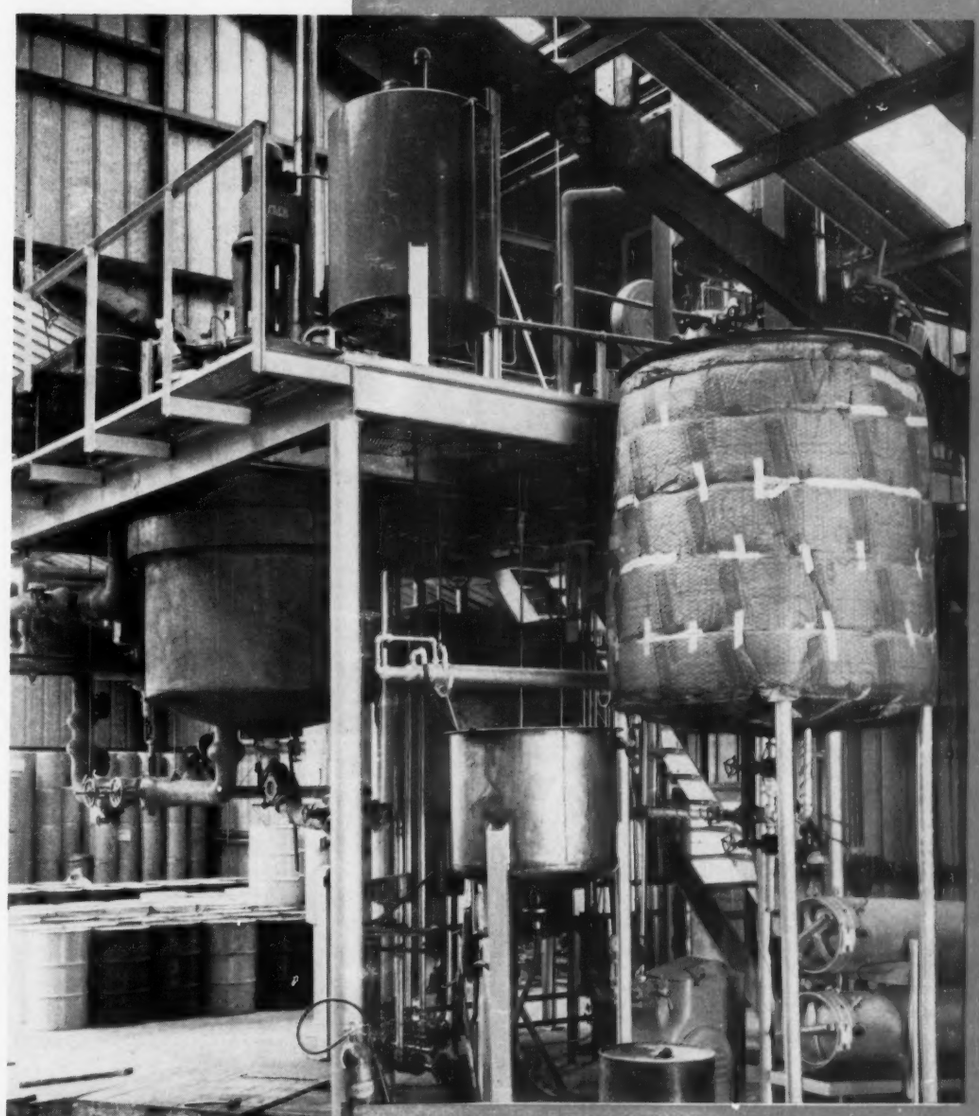

PESTICIDE PLANT—Chapman Chemical Co., Memphis, Tenn., produces all types of pesticides for use in the South. Here is interior of ester plant. See plant story pages 2-8, this issue.

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MAN IN CHARGE—Above, R. C. Harnden, executive vice president of Chapman Chemical Co., Memphis. He is in charge of firm's agricultural division and has guided the company into a prominent position among pesticide manufacturers of the South.

Chapman plant in Memphis finds protection against fire, fumes, and on-job accidents, produces dividends in morale and profits.

Safety Emphasis Pays Off in This Pesticide Plant

A SAFETY PROGRAM started at the Chapman Chemical Co., Memphis, Tenn., several years ago has reduced minor accidents by 90%. It has also reduced the number of fires and breakdowns and has given employees an assurance that their jobs are probably no more dangerous that those in many other professions.

The program has been the result of close cooperation of R. C. Harnden, executive vice president of the firm and head of the agricultural division; Bob Branch, plant manager, and the production superintendent Russell Ruble.

Here are some of the safety rules enforced at the plant, according to Mr. Ruble: men working at or near the dust and liquid units must wear coveralls, safety shoes with non-spark soles or rubber boots, and all glasses must be of the safety type.

Employees confined to the proximity of the formulating and mixing units must have full-face shields. No one is allowed to carry matches in his pockets, and naturally there is a strict no-smoking rule.

"We've spent a lot of study and preparation on what to do in case of fire," explained Mr. Ruble. "The plant has a fire-alarm system, and if anyone pushes one of several buttons, the siren goes on. Each building at the plant has a hose cart equipped with a foam making nozzle."

Fire drills have taught each one of the nearly 100 workers just what to do, as each one has a specific job. There is also a siren for emergencies other than fire.

"We have a trained first-aid man on duty all the time," Mr. Ruble continued. "If a worker shows any signs of exposure to the chemicals, he is removed from that area until the condition clears up. Each worker in these

ALL-OUT PROTECTION — Workers operating near the liquid mixing plant of Chapman Chemical Co. wear masks to prevent accidental inhalation of fumes or from splashes. In addition to masks, workers are also attired in safety uniforms and safety shoes, thus eliminating many of the hazards within the plant.

GOLDEN HARVEST — Drums of liquid insecticides ready for shipment are inspected by Russell Ruble, production superintendent at the Chapman Chemical Co., Memphis, Tenn. Firm's products are sold under trade name of "Golden Harvest." These finished goods are ready to be sent out to dealers handling the line.

areas is given a blood test weekly. The foreman of the mixing unit keeps a watchful eye on his crew. He cautions them on how to handle the equipment, tells them when they are taking unnecessary chances and reports on any working hazard that might be eliminated."

The history of the Chapman Chemical Co. has been one of steady growth. The firm was already one of the major producers of wood preservatives when it added an agricultural division in 1946. Since then Mr. Harnden, head of this division, has made it one of the largest in the Memphis area.

The big plant, located in the south part of Memphis, makes and sells insecticides and herbicides throughout the mid-south, and ships cotton defoliants to areas as far away as West Texas.

The plant has both a dust and a liquid division, with the liquid unit being used increasingly because the trend is toward liquids, the company finds.

"We've doubled our liquid-making capacity within the last year," said Mr. Ruble, "and this summer have been making around 10,000 gallons daily. Our bagging unit has a capacity of 52,500 lb. every eight hours, but we don't mix that much because farmers are turning to liquids."

In climbing to its position as one of the larger pesticide companies of the South, Mr. Harnden says he realizes that no one thing is all-important. In addition to the safety program and a constant effort to improve efficiency, he has also established an aggressive sales department.

He has five outside salesmen, all of whom are entomologists with much experience in selling. These men are very active in working with dealers and farmers. They train dealers in sales methods, acquaint them with the latest products, and hold many field demonstrations and farm meetings.

"The farm chemical industry has done a poor job of merchandising," said Mr. Harnden. "The market potential is tremendous, but because the profit margin is so low, many dealers have made only a feeble effort to sell farm chemicals."

Too often the products a formulator sold have not been in accordance with what the experiment stations dictated. Mr. Harnden says the formulator can do much to advertise and sell his own products, but this takes promotion and sound planning.

"Many dealers are now realizing that they can make a profitable business with farm chemicals," said Mr. Harnden. "By buying quality products and giving the farmer information and a real service program, quite a few dealers are now doing quite well with agricultural chemicals."

One of the fastest selling products made by Chapman is herbicides. The plant is now making both pre-emergence and post-emergence types, and finding a ready sale for them. Defoliants are also growing in use, as farmers turn to mechanical harvesting of cotton.

"In fact, farmers everywhere are realizing that they must farm chemically or get out of business," Mr. Harnden said. "This presents a rare opportunity for the alert dealer who keeps abreast of the many changes taking place. Despite the low profit being made on many products, the future of the industry has never appeared brighter."

INSECTICIDE DUSTS — Chapman Chemical manufactures insecticides in both liquid and dust form. Here is a crew loading bags of dry material on a truck for delivery. Men on truck wear safety goggles to protect their eyes from toxic dusts as bags are being stacked. Manufacture of dusts is on decline at Chapman as demand rises for liquids.

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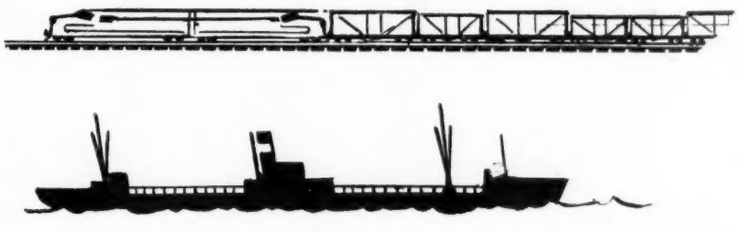

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TVA Describes Steps . . .

Development and Production of High Analysis Superphosphate

By A. B. Phillips
Tennessee Valley Authority
Wilson Dam, Ala.

NEARLY TWO YEARS ago, the Tennessee Valley Authority stopped production of conventional (48% P_2O_5) triple superphosphate in its chemical plant at Wilson Dam, Ala., and introduced a new superphosphate containing about 54% P_2O_5. Production of this "high-analysis superphosphate," is based on the acidulation of phosphate rock with superphosphoric acid, the highly concentrated phosphoric acid (2) developed by TVA in recent years.

After the feasibility was demonstrated of producing superphosphoric acid containing approximately 105% H_3PO_4, it was only natural there should be interest in whether it would be suitable for the acidulation of phosphate rock and whether the superphosphate so produced would have any unique or advantageous properties. It was considered rather doubtful that efficient acidulation could be obtained in view of previous results with conventional acid.

The previous data (3) indicated that relatively poor conversion of P_2O_5 to an available form resulted when acid containing more than about 80% H_3PO_4 was used. However, it seemed possible that some increase in concentration of the superphosphate could be obtained.

Bench-scale acidulation tests were made to study most of the variables thought to be important in the acidulation process. Conditions were found under which superphosphate containing 54% A.P.A. could be produced when using low-grade rock (32% P_2O_5) ground to the fineness normally used in the industry. The grade could be increased to 57% by increasing the grade of the rock to 35% P_2O_5. About 93% of the P_2O_5 in the rock was converted to an available form when the acid and rock were proportioned to give an acidulation ratio (P_2O_5:CaO mole ratio) of 1.00. Increasing the acidulation ratio increased the grade and conversion, but ratios higher than 1.05 produced a rather sticky product.

Acid concentration and temperature were important variables when acidulating with superphosphoric acid. Slight dilution of the acid below its normal concentration of about 105% H_3PO_4 was necessary for proper conversion and to obtain best physical properties. The best results were obtained when the acid was diluted to about 102% H_3PO_4. The temperature of the acid affected the time required for the superphosphate to set and, to a lesser extent, the conversion. A temperature of at least 175° F. was necessary for good conversion. The "set time" was decreased from 120 to 45 seconds by increasing the acid temperature from 175° to 300° F.

The most striking phenomenon observed in the bench-scale tests were the high temperature and the attendant copious evolution of fluorine obtained during simulated denning. Temperatures as high as 330° F. were observed after a short period in the Thermos flask "den." The highest denning temperature was obtained when the acid concentration was 102% H_3PO_4. A high temperature during denning was very important in obtaining maximum conversion and grade of the product.

Pilot-Plant Tests

The next step in the development of high-analysis superphosphate was a pilot-plant-scale study to determine whether acidulation with superphosphoric acid was practical in engineering equipment of the type generally used in superphosphate production. Also, it was desired to obtain data on fluorine evolution under practical conditions, and to produce enough product for use tests. The work was done in a cone mixer mounted over a traveling den of the Broadfield type described in a previous publication (4). The pilot-plant den could be adjusted to give a retention time of 1 hour. The tests were made at a production rate of about 1 ton an hour.

As in the bench-scale tests, it was found that best results were obtained when the acid was diluted to 102% H_3PO_4 and heated above 175° F. Mixing of the rock and acid in the cone mixer was satisfactory. During the hour-long retention in the den, the temperature of the acidulate rose to 340° F., 90% conversion occurred, and about 50% of the fluorine in the rock was evolved.

The superphosphate was quite friable and could be cut easily at the end of the den. After 24 hours in pile storage, conversion had increased to 92% and the proportion of fluorine evolved had increased to 60%. This high fluorine evolution is in sharp contrast to the evolution of about 15% of the fluorine in production of conventional triple superphosphate.

Pilot-plant studies of the use of the product in the continuous ammoniator also were made. Granular 6-24-24 and 12-24-12 grades, which cannot be formulated with superphosphate of conventional grade, were made successfully with the higher analysis material. In general, higher temperatures were obtained with the new material. It appeared that the degree of ammoniation should be held somewhat lower (3.5 vs. 3.8 lb. of NH_3/unit of P_2O_5) than with conventional triple superphosphate to avoid excessive loss of ammonia.

Plant-Scale Operation

The encouraging results obtained in the bench-scale and pilot-plant work led to quick adoption of the production of the high-analysis superphosphate in the TVA demonstration-scale plant. By this means, tonnage quantities could be produced for field tests and experimental use by fertilizer manufacturers.

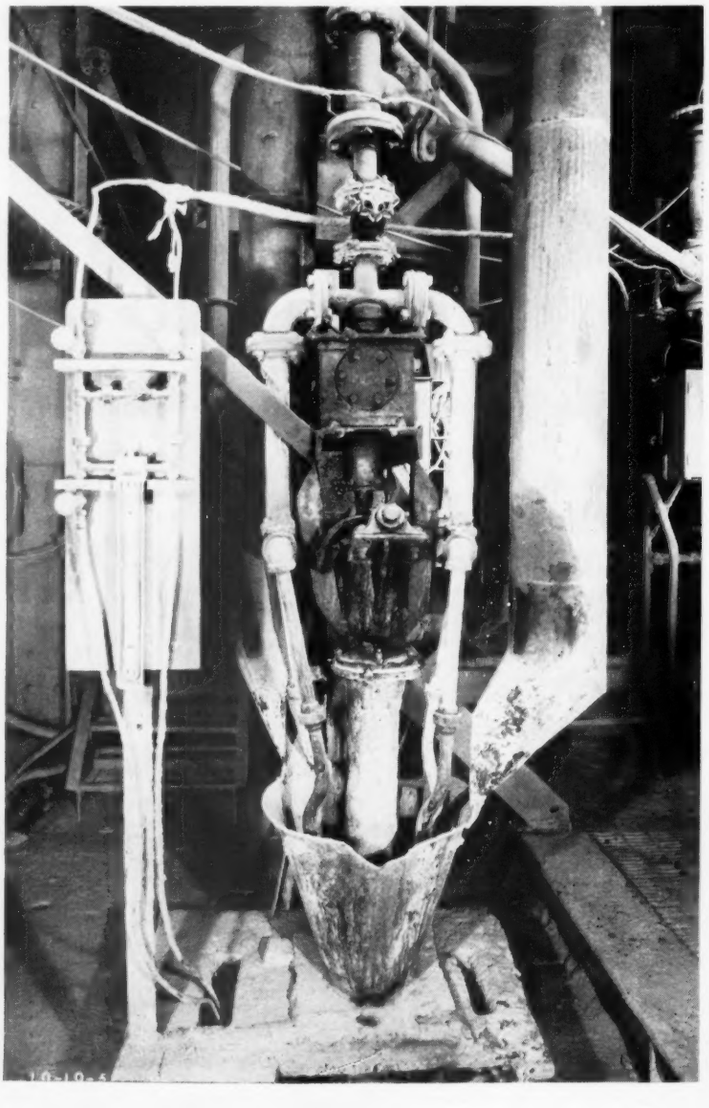
The TVA plant (3), used for a number of years for the development and production of conventional triple superphosphate, was not modified appreciably in changing to the higher analysis material. Superphosphoric acid is diluted to 102% H_3PO_4 and heated to about 225° F. in two Type 316 stainless steel tanks. The tanks contain steam coils, also of stainless steel, and agitators to aid heat transfer. The acid flows by gravity through an orifice meter to a cone mixer. Florida land pebble (32% P_2O_5, 46% CaO) ground to 75% minus 200 mesh is fed to the mixer by a weigh-belt-type feeder.

The cone, fabricated of Type 316 stainless steel, is 18 inches in diameter and 23 inches high. The acid enters tangentially through four nozzles made of ⅜-inch pipe nipples. The acidulate is discharged from the bottom of the cone through a 2¼-inch-diameter nozzle.

The acidulate from the cone is received on a cupped rubber belt 35 feet long and 36 inches wide, known as the "wet belt." The speed of the wet belt is adjusted to give a retention time of about 100 seconds. The acidulate, fairly well "set" at the end of the wet belt, drops onto a short shuttle belt and then on a pan conveyor which discharges to an elevator. The elevator fills monorail cars which deposit the superphosphate on a storage pile in the "A-frame" storage building. The elapsed time from mixing to storage is about 10 minutes. A typical analysis of the product after about 30 days' storage follows:

Per cent						
P_2O_5						
Total	Available	W.S.	F.A.	CaO	F	A.O.A.C. moisture
55.4	54.3	53.1	3.2	21.2	0.7	1.2

The plant is not well suited to the storage pile where the highest reac-



PILOT PLANT SCENES—Practical studies on the manufacture of high-analysis superphosphate were made by Tennessee Valley Authority in pilot plant. Below, one portion of the process is inspected by TVA engineers and visitors at the plant. At right is cone-type continuous mixer used in plant-scale production of high analysis superphosphate. Photos courtesy Tennessee Valley Authority.

production of high analysis superphosphate for two reasons: First, the production rate is limited by the low volumetric capacity of the wet belt. The bulk density of the fresh acidulate is extremely low, about 25 lb. a cubic foot. This, plus the relatively long set time, which requires a lower belt speed, limits the production to 14 tons an hour on the belt designed for as much as 40 tons an hour of conventional triple superphosphate.

Second, since there is no den or holding system, the evolution of fluorine associated with the production of this material takes place in the tion temperature occurs. Thus, there is little opportunity to recover the fluorine evolved.

New facilities that will overcome these deficiencies and provide part of the production in granular form are in the planning stage. The new system will be patterned after a process developed by TVA for producing granular triple superphosphate (1). Acid and rock will be mixed and granulation will take place in a rotary drum mixer. The semigranular product will be retained in a confined space for 8 to 16 hours where the bulk of the fluorine will be evolved and recovered. Then it will be conveyed to storage piles for curing, after which it will be separated into granular and nongranular fractions.

Product Characteristics

Superphosphate produced by acidulation with superphosphoric acid owes its high analysis primarily to its anhydrous nature. The P_2O_5 is present largely as anhydrous monocalcium phosphate rather than the hydrated form of this compound. There is little nonorthophosphate present. The low free moisture content and high evolution of fluorine and other volatile matter also contribute to the high analysis. The fluorine is evolved largely as silicon tetrafluorine.

Because of its anhydrous nature, high-analysis superphosphate will absorb atmospheric moisture more readily than the conventional triple superphosphate. Moisture absorption has not caused a problem in plant-scale operation and storage, however, because the material affected has been confined to only a thin layer on the surface of storage piles.

Furthermore, the absorbed moisture does not cause the material to become sticky, since it is is taken up largely as water of hydration. Care must be taken to avoid undue exposure of samples for analysis, however. Small samples may pick up sufficient moisture to give erroneous analytical results due to dilution of the sample.

The present product cakes less and is easier to reclaim from storage piles than conventional superphosphate. The bulk density of the material in storage is about 35 lb. a cubic foot. After milling and screening for shipment, the density is about 55 lb. a cubic foot, which is not much lower than conventional superphosphate.

Unconditioned high-analysis superphosphate does not store well in bags, probably due to its dehydrating characteristic and the continued evolution of small amounts of fluorine. Neither asphalt-laminated nor polyethylene-coated bags have been satisfactory for more than 1 or 2 months of storage. The bags became embrittled and broke when handled. Conditioning with calcined dolomite or limestone (3 to 5%) largely overcomes bag deterioration but reduces the grade to an undesirable extent.

Promising results have been obtained by conditioning with as little as 0.5% of ammonia. It is believed this will prove to be a satisfactory solution to the problem where storage in bags is required.

Besides the savings in handling and shipping that result from its higher analysis, the new superphosphate will permit the production of higher analysis mixed goods than can be made with conventional superphosphate. Alternatively, an advantage in formulating cost can be gained by its use in grades of intermediate analysis since it will permit the use of more low-cost ordinary superphosphate in the formulations.

Operators who have received TVA shipments have reported that the handling characteristics are better than those of conventional triple superphosphate. A decrease in the dust problem is most often mentioned.

A large backlog of experience in producing and utilizing high-analysis superphosphate is being accumulated through TVA's demonstration-scale production. Through the operation of the new facilities, an alternate method yielding a granular product will be available. A large cooperative has announced plans for commercial production of high-analysis superphosphate in the West. Other commercial exploitation awaits further technology or circumstances that will cheapen the cost of electric furnace superphosphoric acid as compared to wet-process acid, or the development of means of producing superphosphoric acid by the wet process.

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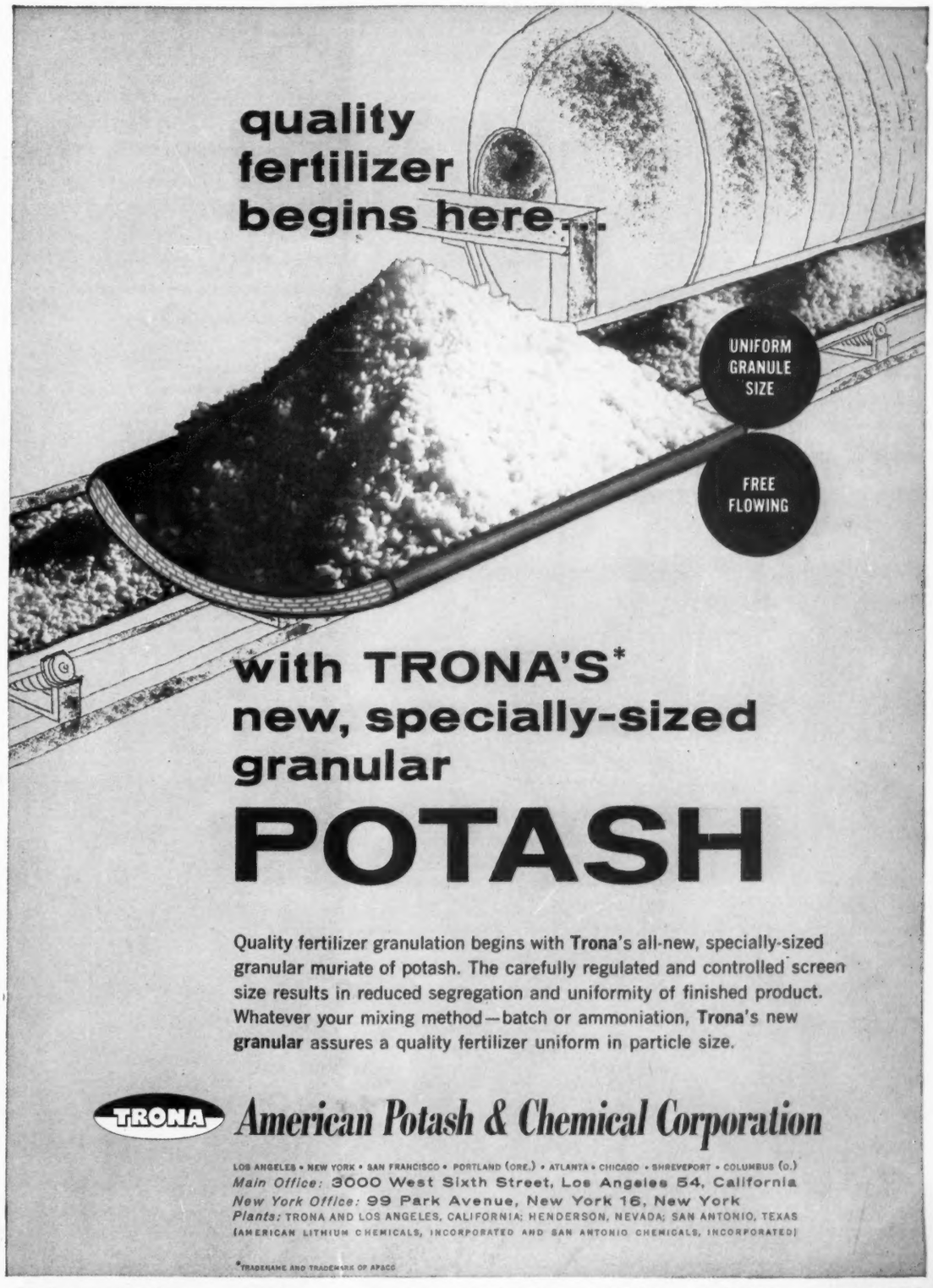
WITCO DIVIDEND

NEW YORK—The board of directors of Witco Chemical Co., Inc., on Dec. 8, voted a regular dividend of 25¢ per share, payable on Jan. 14, 1960, to shareholders of record as of Dec. 31, 1959.

Calspray Names New Plant Superintendent

RICHMOND, CAL. — Dale Huntsman, plant manager for California Spray-Chemical Corp.'s Richmond plant, recently announced the appointment of James B. Stichka as plant superintendent of the Richmond fertilizer manufacturing operation. Mr. Stichka most recently held the title of project supervisor in the engineering division at Calspray, supervising design and construction at the Richmond and Kennewick, Wash., fertilizer plants. Prior to that, Mr. Stichka was senior engineer at the Livermore, California, nuclear development project of California Research and Development Co.

Mr. Stichka is a graduate of both the University of California and the California Institute of Technology, receiving cum laude honors at both institutions. He now resides at Walnut Creek, Cal.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Joins Standard Steel's Process Equipment Division

LOS ANGELES—Maynard C. Isheim has been named manager of process equipment division of Standard Steel Corp., Los Angeles, Robert S. Burns, president, has announced. The division designs and builds rotary dryers, kilns, and coolers for the chemical, and other industries; and sewage sludge drying plants.

M. C. Isheim

Mr. Isheim joined Standard Steel in May, 1959, as assistant chief engineer of the process equipment division. For 12 years prior to this, he was affiliated with C. O. Bartlett & Snow Co., Cleveland, Ohio.

He is a graduate of Case Institute of Technology with a degree in chemical engineering and he also earned a degree in mechanical engineering at Fenn College, Cleveland.

NAM Elects Officers

NEW YORK—Rudolph F. Bannow, president of Bridgeport Machines, Inc., Bridgeport, Conn., was elected president of the National Association of Manufacturers Dec. 4, at the 64th annual Congress of American Industry at the Waldorf-Astoria here.

Other officers elected include: chairman of the NAM board—Stanley C. Hope, president, SoundScriber Corp., North Haven, Conn.; chairman of the NAM executive committee—Milton C. Lightner, chairman of the board, The Singer Manufacturing Co., Elizabeth, N.J.; chairman of the NAM financing committee—Ernest G. Swigert, president, Hyster Co., Portland, Ore.; NAM National vice president—John W. McGovern, president, United States Rubber Co., New York.

Fertilizer Strike Ends

ATTALLA, ALA. — After being closed for 235 days by a strike of United Steelworkers Union members, the Attalla fertilizer plant of the Tennessee Corp. has resumed operations.

The strike began April 13 and came to an end with the signing of a one-year contract ending Dec. 1, 1960. The new contract calls for wage increases of from 10¢ to 20¢ an hour for regular employees; a week's vacation with pay after one year of employment; four paid holidays annually, four hours reporting pay and a checkoff system for union dues.

NEW ASSISTANT MANAGER

WILMINGTON, DEL. — The appointment of Charles S. Rowe, Jr., as assistant manager of Atlas Powder Company's Chicago Region chemicals sales office has been announced by Cornelius D. McGrath, chemicals division field sales manager.

To Add Pesticides to Present Fertilizer Line

PHOENIX, ARIZ. — Arizona Agro Phosphate Co., a division of the Wilbur-Ellis Co., San Francisco, has announced the addition of insecticides to its manufacture of fertilizers.

Raymond Laine, manager, said the new 11,000 square foot building now under construction, with machinery, will represent an investment of some $100,000.

It is expected to add some 10 people to the division's staff of 35 employees. The firm also will package fertilizers for homeowners as well as for agriculture and will produce insecticides for both these markets, Mr. Laine said.

To Enlarge Plant for Hawaiian Agriculture

HONOLULU, HAWAII—The only insecticide formulating plant in the nation's newest state is being enlarged from 4,000 to 6,000 sq. ft. and operating capacity will be increased by about 25 per cent.

Charles Yent, general manager of The Diversey Corp., Honolulu, says that a new factory currently under construction will replace the smaller one in order to meet the increasing demands of agriculture in the islands. Distribution will be limited to the 50th state.

The plant produces wettable powders such as malathion, parathion, and others, and will act only as a formulator-distributor. The facility is expected to be ready for production by the early spring.

New Granular Product Announced by Firm

CHARLESTON, S.C. — Planters Fertilizer and Phosphate Co., of Charleston, first plant to produce granular-type fertilizers in South Carolina, has announced the addition of a new 16-48 formula to be marketed under the name of "HI-NI," for coastal bermuda pastures and small grains.

W. O. Hanahan, president of the company, says the new product saves in application costs, and offers additional benefits of being a granular-type fertilizer.

Planters company recently installed granular-type producing equipment and has marketed several successful formulas. "HI-NI," newest of the granulars, was developed under the supervision of A. C. Palmer, general manager.

BIG NEWS IN FERTILIZER PACKAGING:

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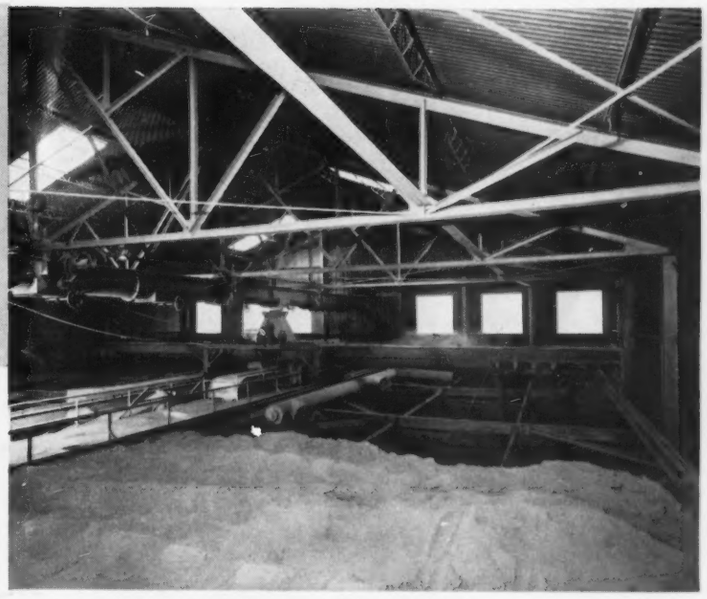
BERRY GROWERS' DILEMMA

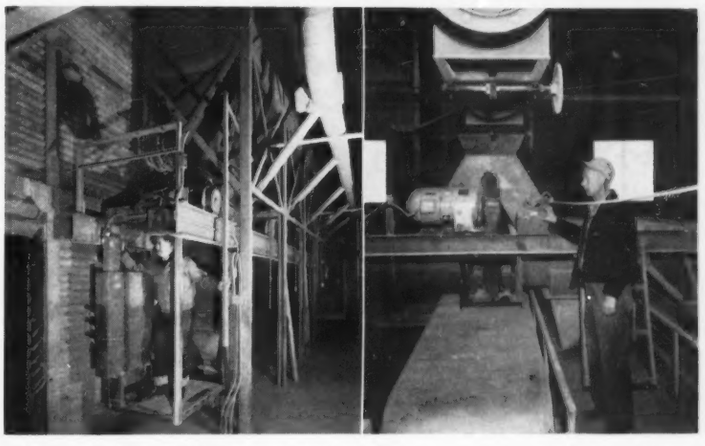
WAREHAM, MASS. — Approximately 1 million barrels of cranberries worth $13 million will be lost as a result of the contamination scare, George C. P. Olson, president of Ocean Spray Cranberries, Inc., predicted on Dec. 16. Of the 1 million barrels of perishable berries resting in warehouses across the country, half are Massachusetts berries, Mr. Olson said.

He said this represents about $6.5 million to Massachusetts growers. It reflects a serious economic blow not only to the growers, but to the state as well, he said. The financial blow will be even greater unless there is greater movement of processed berries in dealers' warehouses and in stores, he reported.

Mr. Olson estimated that at the present time there are about 4 million cases of processed cranberries in warehouses or in stores. He said these berries represent about $17 million. Mr. Olson gave the figures a few hours before a scheduled meeting of several hundred members of Ocean Spray Cranberry Associates and independent growers at Wareham Town Hall, to report to growers what has been done since the weed killer scare.

Efficient Handling of Fertilizer Components Leads to Success Story





INSIDE UTAH PLANT — The distributing screw conveyor at top left, at Wasatch Chemical Co., Salt Lake City, has rack-and-pinion gates at 6-ft. intervals, through which it discharges to left or right onto a traveling screw conveyor which delivers bulk chemicals to any of ten storage bins. Carriage for traveling screw conveyor rests on eight wheels which run along four tracks. In lower picture, left, is traveling weigh larry. In making up desired formulas, correct proportions of components are loaded into it and are then discharged to a floor hopper. A screw conveyor carries material to screening, grinding and mixing process. The traveling screw conveyor is positioned by push button beneath any of ten spots in the distributing screw conveyor. The rack-and-pinion gates are curved to fit the contour of the bottom of trough, preventing contamination of the various chemicals.

WASATCH CHEMICAL CO. of Salt Lake City, Utah, has recently completed installation of conveying and elevating equipment for moving incoming bulk chemicals from railroad cars to storage and from batching bins to the screening, grinding and mixing operations.

A feature of the system is a 60-foot long traveling screw conveyor which can be positioned by push button to discharge bulk chemicals for fertilizer into any of ten storage bins.

The various fertilizer components are unloaded from railroad cars into a track hopper equipped with a "grizzly" for breaking up large lumps. From the hopper the material is drawn by a 16-in. diameter screw feeder, 31 ft. long, which delivers it to a centrifugal discharge bucket elevator, 48-ft. centers, which carries it up to the distributing system atop the storage bins.

A divider gate permits the elevator to discharge either directly to processing or to a 16-in. diameter horizontal screw conveyor, 84 feet long, located over the center line of the storage bins.

This distributing screw conveyor is equipped with rack-and-pinion gates at 6-ft. centers and a chute and divider gate arrangement permits discharge to left or right onto the traveling screw conveyor, which discharges to the various bins. To reduce contamination of the materials the rack-and-pinion gates are curved to fit the contour of the bottom of the trough.

The traveling screw conveyor is on a carriage which travels on eight wheels along four parallel tracks. Using push button control, the conveyor is moved along the rails and positioned by gearmotor connected by roller chain drive to one of the inboard carriage wheels.

Only one man is required for opening the desired gate in the distributing screw conveyor carriage beneath the desired opening. The inboard portion of the traveling screw conveyor is in a closed trough while the outer section at each end is open. As the pile builds up to the level of the screw conveyor a bed is formed over which additional material travels. A pile is thus gradually built up along the line of the conveyor.

In addition to the storage conveyor system, batching equipment has been installed to eliminate hand batching. A series of batching bins feed a traveling weight larry through hand-operated quadrant gates.

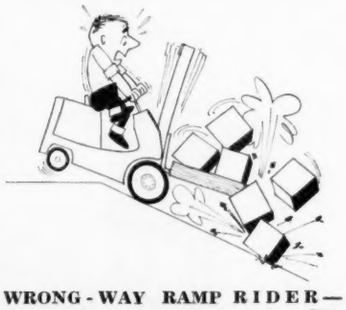
After fertilizer components have been loaded in proper proportions, this larry discharges to a floor hopper and a 16-in. screw conveyor carries the chemicals to the screening, grinding and mixing operations. The fertilizer is then discharged to the baggers.

Wasatch Chemical Co. produces a complete line of fertilizers for farm, garden and lawn under the brand names "Morgro" and "Wasco." Insecticides and fungicides are also formulated and detergents, disinfectants and air sprays manufactured. The company, too, distributes heavy and fine chemicals throughout the intermountain area.

Basic chemicals are purchased by the carload, stored and mixed as desired. The seasonal nature of the business calls for large storage facilities and a materials handling system adequate to handle heavy peak loads. Materials are received at a relatively constant rate throughout the year with the peak season coming in March, April and May.

During this period Wasatch Chemical Co. operates on two shifts, six days a week, to produce fertilizer at a rate of 25 tons an hour. The ten storage bins are each of 300 tons capacity and the conveyor and elevating system for moving inbound bulk chemicals is capable of handling 30 tons an hour.

THINK SAFETY!



WRONG-WAY RAMP RIDER — Automatic Transportation Co., Chicago, has issued the above poster. It warns plant personnel not to be a "wrong-way ramp rider." Instead "back down so gravity is on your side and holds load tight against mast. And DO look in the direction you're driving!"

An announcement of interest to

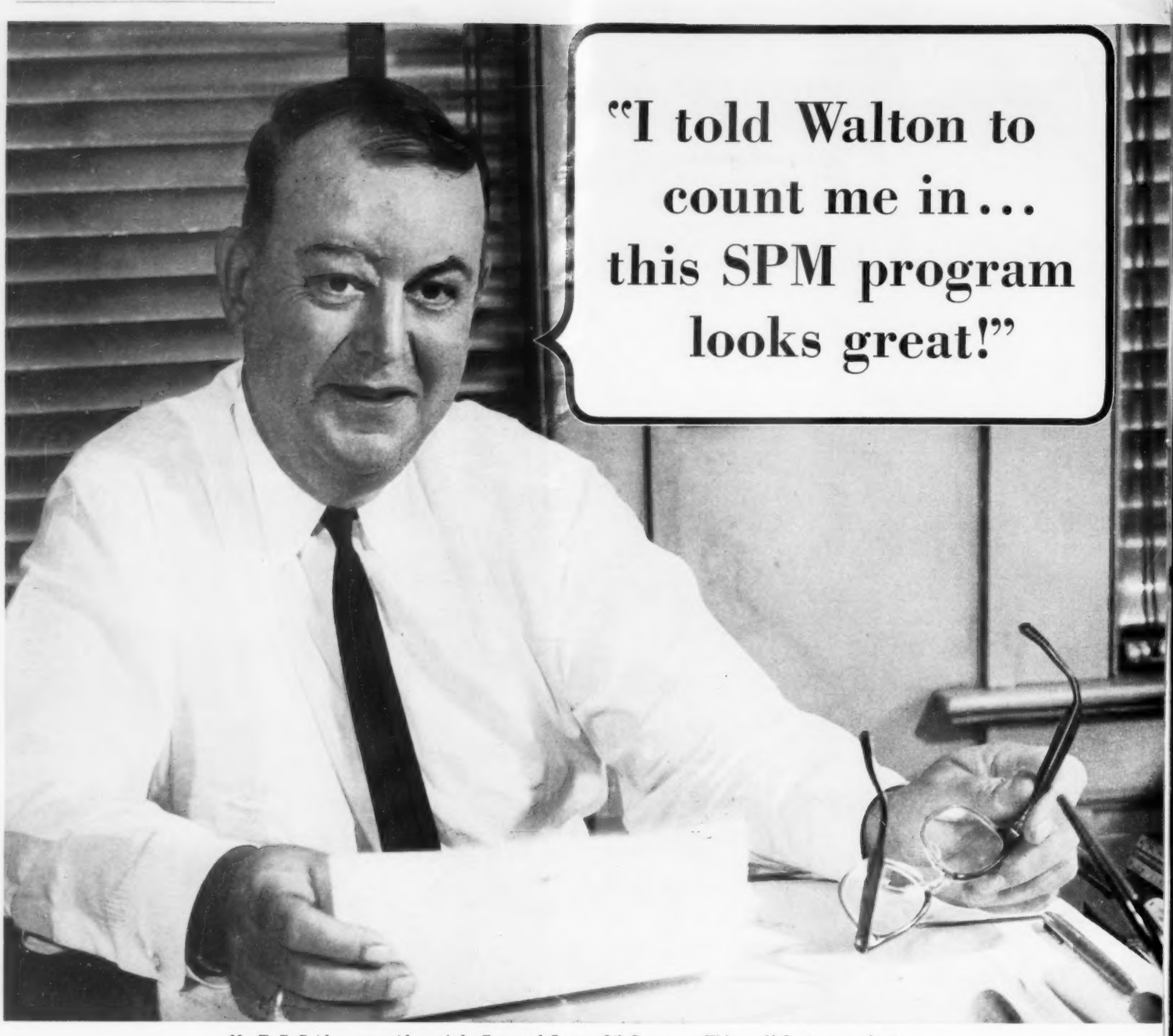
FERTILIZER MANUFACTURERS:

- If you are seeking top quality in Aldrin Granules — with minimum fines — and maximum uniformity in particle size — we suggest you buy Riverdale Aldrin Granules.
- We have installed the latest type tumbling equipment to insure the finest, most uniform Aldrin Granule on the market.
- Write for prices on Aldrin.
  Granules: 40%, 25%, 20% — Liquids: 4 lb., 3⅓ lb., 2 lb.

Riverdale CHEMICAL COMPANY

A complete line of Chemicals for Agriculture

17th Street & Hanover • Chicago Heights, Illinois • SKyline 6-2010



Mr. T. F. Bridgers, president of the Farmers' Cotton Oil Company, Wilson, N.C., is an enthusiastic supporter of the Sul-Po-Mag program. On the adjoining page he and vice-president E. R. Bridgers get full details on the 1960 SPM program from IMC district sales manager Walton Dennis.

The Sul-Po-Mag program is designed to boost sales of fertilizers containing Sul-Po-Mag. Get the full story from your IMC representative.

In many parts of the country, *magnesium* is now recognized as the fourth major plant food element. At the same time, growers consider yearly applications of a mixed fertilizer containing Sul-Po-Mag as the easiest, surest and most economical way to protect against crop losses caused by magnesium-poor soil.

What has caused this growing awareness of the need for magnesium? To a great extent, it's the result of fertilizer manufacturers tying in their local promotion with the SPM program. For several years, International has gone all out in emphasizing the need for magnesium, both to growers and to influence-groups such as county agents, vo-ag teachers, and extension specialists.

Just what is the SPM program? It is an educational program designed to acquaint agriculture with the ever-increasing need for magnesium in our soils. It points out the exclusive advantages of fast-acting, long-lasting Sul-Po-Mag as the best way to guard against magnesium shortage.

You'll benefit from the growing demand for magnesium created by a full schedule of agriculture magazine ads . . . plus the promotional materials you need to complete the job in your local area. You are provided newspaper ad mats, tags, seal imprints, imprinted direct mail pieces and posters . . . all at no cost.

Your SPM advertising materials are directed specifically to the growers in your own area. The materials will discuss the magnesium fertilization problems of the major crops grown in your area.

Get full information on the SPM program through your IMC representative.

Products* for growth

50 IMC

1909-1959

*Trademark

Mr. E. R. Bridgers, vice president of the Farmers' Cotton Oil Co., greets Walton Dennis, IMC district sales manager. Let's look in as Mr. Dennis reviews the elements of the 1960 Sul-Po-Mag program.

"Mr. Bridgers, we at IMC consider this booklet a vital part of our Sul-Po-Mag promotion. It illustrates the importance of magnesium for high crop quality and top yields. We've answered requests for thousands of these booklets from all parts of the country."

"With our new series of ad mats, you can bring the full force of the Sul-Po-Mag program right to your selling area through your local paper. These ad mats are keyed to your selling season and to the major crops in your area. They'll move mixed fertilizer containing Sul-Po-Mag."

"This crop package . . . including mailers, leaflets and jumbo post cards . . . gives you *maximum selling impact* on the local level. These materials discuss the need for Sul-Po-Mag by individual crops . . . and they can be imprinted with your company name and address to make the promotion really yours."

"Here's something else we're doing. IMC sends out this Sulphate Bulletin every 3 months to keep fertilizer manufacturers, county agents, vo-ag teachers, extension people and growers up-to-date on the latest developments in magnesium, potash and sulphur fertilization."

"You can see we make good use of your Sul-Po-Mag mailers and envelope stuffers, Walton. We send them out with our monthly billings. The extra sales we've gotten has really been gratifying. Speaking of sales . . . let's drop in on one of our dealers."

Mr. B. A. Barnes, Jr., manager of the B. A. Barnes Cotton Company said, "We've had folks come in and ask for *Farmers* brand fertilizer because they know it contains Sul-Po-Mag. Many of our customers specify Sul-Po-Mag by name. It gives folks peace-of-mind knowing they're protected against magnesium deficiency."

"I'm glad to see you're taking advantage of our imprinting service. Growers seeing your company's name on this full-color wall chart will think of you as an expert in magnesium fertilization. Also, imprinting helps tie in your SPM materials with your total advertising effort."

"The Sul-Po-Mag program has paid off for us where it really counts, Walton . . . in increased fertilizer sales. By putting Sul-Po-Mag in our fertilizers, such as our "Golden Gem" and "Victory" tobacco grades, we're established as being up on the needs of the growers. We're sold on the SPM program."

83-59

AGRICULTURAL CHEMICALS DIVISION

INTERNATIONAL MINERALS & CHEMICAL CORPORATION

Administrative Center: Skokie, Illinois

YEAR-END PROBLEM . . .

Full Inventory Necessary For Federal Tax Purposes

Book inventory permissible for reporting taxable income, but physical inventory is required at "reasonable intervals" to confirm balance on books. Best time to take inventory is when stocks are low and plant relatively slow at end of calendar year.

By Paul Lockwood
Croplife Special Writer

PHYSICAL INVENTORY is a chore and a headache. Here are some questions and answers to help make your inventory quicker, easier and to save tax dollars for your fertilizer plant.

QUESTION: Why is a physical inventory necessary?

ANSWER: First, it is required by the Internal Revenue Code. "In every business in which the production, purchase or sale of merchandise produces income an inventory is necessary. The listing of unsold goods at the beginning and end of each year is required to correctly reflect the income for tax purposes."

Second, all of the stock purchased or produced during the year may not be sold during that year. This will give you a larger inventory at the end of the year than at the start and will affect your profit. Or, the stock sold during the year may include all purchases or production plus some of the carryover from a previous year. This, too, affects your taxable profit.

QUESTION: Can a book inventory be used for reporting taxable income?

ANSWER: Yes. The Internal Revenue Bureau permits the use of book inventories in Section 29.22. The book inventory is assumed to reveal the exact inventory position at any given date and can be used for tax reporting. The Code requires that the balance shown on the book inventory be verified at reasonable intervals by physical inventories of the stock.

QUESTION: When should the physical inventory be taken?

ANSWER: The Internal Revenue Code says, "The inventory of unsold goods on hand at the beginning and end of each year is required." However, the "year" referred to is a taxable year—a fixed period of time not longer than twelve months.

Many taxpayers automatically consider Dec. 31 as the time to take inventory. If you report on a calendar year basis, the inventory at this time must be reported. However, for practical purposes the **physical** inventory is often taken at other dates than Dec. 31. When this procedure is followed adjustments must be made in your book inventory to bring it into line with the physical stock count.

Fertilizer plant management suggests that these times for taking a quicker and easier physical inventory be adopted:

1. When stock is at a low point.
2. When plant activity is slow.
3. When the plant is closed—(Vacation, for instance).

These times avoid confusion and lead to a more accurate inventory. With stock at a low point there is less to count and list, thus there is less chance for error.

QUESTION: What should be included in the physical inventory?

ANSWER: The easy answer is "everything." But, to be more specific here is a check list of items to include:

1. All finished goods.
2. Goods in process.
3. Raw materials.
4. Supplies—if for sale or will become part of the finished product offered for sale.
5. Goods in transit—if you have title.
6. Goods on consignment—if you have title.

QUESTION: How should goods in process be valued in the inventory?

ANSWER: The Internal Revenue Code spells out three things that should be considered in arriving at the inventory value for goods in process. They are:

1. Cost of all raw materials and supplies used in the process to date.
2. Direct labor costs to this point in production.
3. A reasonable amount for overhead including all management expenses.

Selling costs are not included in the valuation of any goods in process or in finished goods to which you hold title.

QUESTION: Can a fertilizer plant take depreciation on its inventory?

ANSWER: No. According to Section 29.23 of the Internal Revenue Code, inventories are not depreciable property. Your ending inventory of last year and your beginning inventory of this year should be identical.

QUESTION: How should unsaleable supplies and materials be valued in the inventory?

ANSWER: Items not saleable at normal prices or in the normal way, should be valued at a reasonable selling price. If there is a direct selling cost or disposition cost in liquidating these unsaleable items, this is taken from the fair value.

QUESTION: How should the inventory be valued?

ANSWER: There are four methods that can be used for the inventory in your fertilizer plant. They are:

1. **Cost.** This is the invoice cost minus any trade or other discounts. Cash discounts can be taken from the invoice price or credited to a cash discount income account as long as the policy is consistently followed.

2. **Cost or Market, whichever is lower.** When your fertilizer plant inventory is valued (end of taxable year) the invoice cost and current market values of each item are compared. The lowest price—cost or market—is used for your inventory and for tax reporting.

3. **FIFO.** This assumes that the supplies and materials first acquired were the first sold, hence the name—First-In First-Out.

4. **LIFO.** This method (Last-In, First-Out) assumes that the last stock acquired was the first sold. Thus, the remaining inventory represents the materials and supplies on hand for the longest time.

The method selected for the first inventory must be used consistently and for the complete inventory (except with LIFO which can be for one part of the inventory).

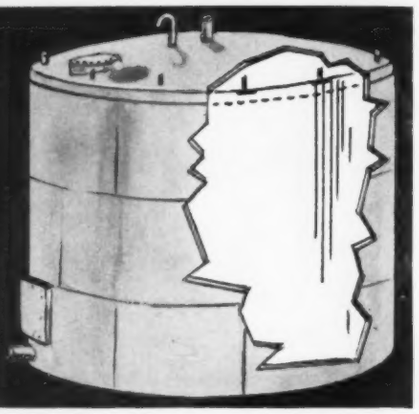
QUESTION: Can a fertilizer plant change the method of inventory valuation used?

ANSWER: Yes. You must obtain permission from the Commissioner. Apply within 90 days after the beginning of the taxable year to be covered by the return.

To change to LIFO, you file Form 970 in triplicate with your income tax return for the taxable year covered.

Turn to **INVENTORY** page 27

don't be caught short!



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FLEXI-LINERS cost only one-fourth as much as high-priced stainless steel or rubber-lined vessels. You save even more by installing them easily yourself or with the help of our factory-trained servicemen.

Best of all, you'll get years of trouble-free performance from every FLEXI-LINER. Widely used in the chemical industry, FLEXI-LINERS have already built a reputation for long-life and economy.

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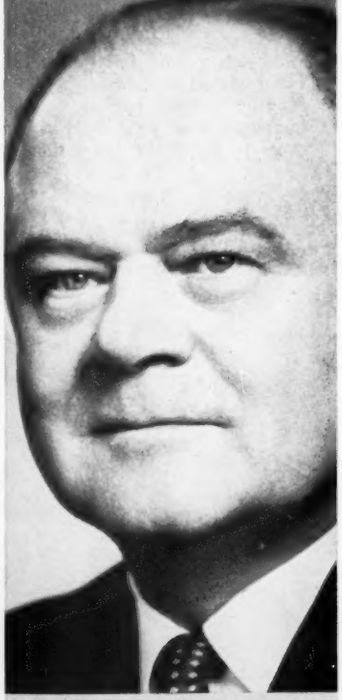

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Arcadian® News

Volume 4 | For Manufacturers of Mixed Fertilizers | Number 12

Technical Tips for Better Ammoniation

NEW WAY TO PREVENT BAG SET

While conducting pilot plant studies on the use of the pre-reactor to make high analysis fertilizers, Nitrogen Division experts also ran bag storage tests. Producers will find the results of these tests most interesting. Details—including the formulation and processing data for each product made—are given below:

Four Formulations

Four grades were made: 14-0-14, 16-0-8 and two 16-8-8 formulations. The 14-0-14 and 16-0-8 materials were made with a nitrogen solution composed of: 19% ammonia, 72.5% ammonium nitrate, 8.5% water, and a total nitrogen content of 41%. Sulphuric acid was used to neutralize the free ammonia. Regular, no-granular muriate of potash was the source of K_2O, and dolomite was used for filler. Dolomite particle size was about 80% through 200 mesh.

One of the 16-8-8 formulations (16-8-8A) used the same raw materials as above, with the addition of normal and triple superphosphate to supply the missing P_2O_5. In the case of the 16-8-8B product, the nitrogen solution used contained 25.3% ammonia, 69.2% ammonium nitrate, and 5.5% water—with a total nitrogen content of 45%. Normal superphosphate and wet process phosphoric acid supplied the P_2O_5. Other raw materials for both of these 16-8-8 formulations were the same as in the 14-0-14 and 16-0-8 products.

Of the materials charged in making these four products, ammonium nitrate—considered by many to be the most influential factor in caking—varied from 502 pounds per ton (14-0-14) to 580 pounds per ton (16-8-8A). See Table 1.

(Continued on following page)

TABLE NO. 1 — FORMULATIONS — POUNDS PER TON

Fertilizer Grade	14-0-14	16-0-8	16-8-8A	16-8-8B
Formula				
Nitrana 4M (19NH_3, 41N)	693	790	801	—
Nitrana 7 (25.3NH_3, 45N)	—	—	—	735
Normal Super (18.96 A.P.A.)	—	—	560	646
Triple Super (44.1 A.P.A.)	—	—	133	—
H_3PO_4 (58.2)	—	—	—	89
H_2SO_4 (93)	412	465	353	389
KCl (60 K_2O)	473	270	270	270
Dolomite	490	555	20	20

(Continued from preceding page)

For all four formulations, the basic process equipment used included: a pre-reactor, pug mill mixer, dryer, cooler, screens and a crusher. Total throughput capacity was about 1000 pounds per hour, giving a production rate of 500 pounds of product per hour at a 1 to 1 recycle ratio. Product size was taken as minus 6 plus 20 mesh.

In making the 14-0-14 and 16-0-8 grades, all of the nitrogen solution and acid were processed through the pre-reactor and overflowed continuously as a slurry to the pug mill at a temperature of 291°F and a water content of 5.8%. When this slurry combined in the pug mill with the muriate of potash, dolomite and recycle the resulting mix had a temperature of about 185°F and contained 2 to 3 per cent water. From the pug mill the mixture passed to the dryer where moisture was reduced to 1% or less. Material from the dryer then went to the cooler, and from there to the screens. Oversize material was diverted to the crusher. The product size was taken out and fines were returned to recycle.

While processing the 16-8-8 products, a portion of the nitrogen solution was fed to the pug mill to ammoniate the superphosphate. The remainder of the nitrogen solution, all of the sulphuric acid, and (for the 16-8-8B product) the phosphoric acid were fed to the pre-reactor.

Conditions in the pre-reactor for the 16-8-8A formulation were basically the same as for the 14-0-14 and 16-0-8 grades. However, for the 16-8-8B formulation, a somewhat higher slurry moisture and a slightly lower pre-reactor slurry temperature were used. Other 16-8-8B process conditions—in the dryer, cooler, screens and crusher—remained the same. For process operating conditions in detail, see Table 2.

TABLE NO. 2—OPERATIONAL DATA

Fertilizer Grade	14-0-14	16-0-8	16-8-8A	16-8-8B
Temperatures °F				
Pre-reactor Slurry	291	291	293	284
Dryer Feed	187	183	176	144
Dryer Product	187	171	199	185
Cooler Product	140	136	158	129
Moistures %				
Pre-reactor Slurry	5.8	5.8	5.8	6.5
Dryer Feed	2.1	2.6	2.3	2.7
Product Out	0.2	1.0	0.4	0.3

TABLE NO. 3—BAG STORAGE TESTS

Fertilizer Grade	14-0-14		16-0-8		16-8-8A		16-8-8B	
% Kaolin Coat (1)	0	2	0	2	0	2	0	2
Initial Moisture, %	0.69	0.60	1.01	0.90	0.44	0.48	0.28	0.40
Inspections and Grade (2)								
30 day	D	A	D	B	A	A	A	A
90 day	D	B	D	B	A	A	B	A
180 day	—	B	D	B	B	B	D	B
Final Moisture, %	—	0.93	1.03	1.05	0.79	0.86	0.93	0.97

(1) Kaolin Clay—Specific surface of about 16,000 cm^2/gm.
(2) Grading Code—A—Free flowing when bag is removed from pile.
B—Free flowing after one 3-foot drop on flat side.
C—Lumps remaining after one 3-foot drop on flat side.
D—Two or more 3-foot drops required to break bag set.

Clay Coating Tested

To determine the effect of a coating agent on product storage characteristics, equal amounts of product in each grade were coated with a 2% clay coat to supply material for comparative testing of coated and uncoated products. A kaolin type clay with a specific surface of about 16,000 cm^2 per gram was used. However, other clays or kieselguhrs with equivalent total surface would probably serve just as well for this purpose.

Test Ran For 6 Months

Storage data on bags of coated and uncoated products were obtained over a six month storage period. All test bags, of 5-ply construction (3 paper and 2 inner asphalt liners), were the 100 lb. size. They were positioned two and three bags up from the bottom, in piles twelve bags high. The storage area was a one story unheated cinder block building with a concrete floor.

Each test bag was inspected and graded for degree of caking at the end of 30, 90 and 180 days of storage. The *uncoated* 14-0-14 and 16-0-8 products, having an initial moisture content of 0.69% and 1.01% respectively, were found to be severely caked at each of the inspection periods. These products had a hard bag set requiring two or more drops of the bag on the flat side from a height of about three feet to break bag set. From this it would be natural to expect that both of these products would cake rather severely in either bulk or bag storage. Somewhat lower initial moistures could be expected to improve storage condition.

The coated 14-0-14 and 16-0-8 products, having about the same initial moisture as the uncoated, showed essentially no caking over the entire test period. Inspection after 30 days showed that the 14-0-14 was free-flowing, and that the 16-0-8 had only a slight bag set, requiring only one drop of the bag to make it completely free-flowing. After 90 and 180 days, both products were in the same condition as the 16-0-8 at 30-day inspection.

16-8-8 Fares Better

The 16-8-8 products, having a somewhat lower initial moisture, showed good condition, with the exception of the uncoated 16-8-8B at the 180 day inspection. Both the coated and uncoated 16-8-8A and the coated 16-8-8B were free-flowing after 30 and 90 days of storage, and showed only a slight bag set after 180 days of storage. The uncoated 16-8-8B was free-flowing at 30 days, had

a slight bag set at 90 days, and was severely caked after 180 days of storage. See Table 3.

Where Coating IS Needed

Results of these tests indicate that X-O-X fertilizers (no P_2O_5) made by the pre-reactor process should be dried to a very low moisture level, preferably below 0.5%. In addition, they should be coated with an inorganic coating material such as clay or kieselguhr in order to have good condition in storage. As regards NPK grades made by this process, good storage condition would be expected, provided the product is dried to a very low moisture level, preferably below 0.5% or less. The addition of a coating would be beneficial, but it is not as important as for the X-O-X grades.

Nitrogen Division PILOT PLANT is Modernized

The finishing touches in the extensive modernization of Allied Chemical Corporation's Nitrogen Division pilot plant have just been completed. New and redesigned equipment and facilities make this famous research and development center capable of testing just about every type of fertilizer manufacturing technique imaginable.

The original Nitrogen Division pilot plant has contributed advance after advance to the technology of ammoniation processes for semi and full-granular mixed fertilizer. Many other products, now serving farmers and homeowners, have benefited as well.

To Serve You Better

A full staff of experienced engineers and technicians at Nitrogen Division's pilot plant, working closely with technical service people in the field, has always been available to mixed goods producers. Now—with new and additional plant facilities covering a wider range of manufacturing techniques, this pilot plant service has become even more valuable for producers. So, if you have a formulation or manufacturing problem in *your* plant, be sure to take advantage of this expert assistance. There's no obligation. Write Technical Service, Nitrogen Division, Allied Chemical Corporation, 40 Rector Street, New York 6, N. Y.

Corn is a heavy user of sulphur. So are cotton, legumes, onions and cabbage. Some crops need more sulphur than phosphorus. Many soils are running out of sulphur fast. It pays to tell farmers your mixed fertilizers contain sulphur.

SULPHUR IS A BONUS VALUE IN YOUR MIXED FERTILIZER

It will pay you and your dealers to tell farmers about the big extra benefits they get from the sulphur you put in your mixed fertilizers. Farmers pay for a guaranteed content of nitrogen, phosphoric acid and potash. At no extra cost, you also give them sulphur which is a vitally important plant food. Many farmers are not aware of this fact. They do not realize the need for sulphur in crop production until serious deficiencies appear in their soils.

The fertilizers you make with ammoniated superphosphate are a rich source of sulphur. Normal superphosphate contains more sulphur and more calcium than phosphorus. When you use sulphuric acid to neutralize "excess" ammonia in producing high-nitrogen mixtures, you add sulphur to your fertilizer. And, of course, sulphate of ammonia in fertilizers supplies sulphur for crop production.

Depending on your production technique, it is easy to calculate the amount of sulphur your mixed fertilizer contains. *Make this a sales point!* Tell your customers they are getting valuable quantities of sulphur and paying nothing for it except transportation costs. This is a big extra bonus!

Leading Crops are Heavy Users

Crops, on the average, remove about as much sulphur from the soil as they do phosphorus. Yet the average soil contains only half as much sulphur as phosphorus. Cotton, corn, tobacco, legumes, grass, onions and cabbage are heavy users of sulphur and require considerable amounts for high yields.

Sulphur disappears fast, if it is present in the soil. Leaching can remove 30 to 60 pounds per acre per year. Erosion often removes six pounds of sulphur per acre per year. On most farmland, leaching and erosion carry off much more sulphur than rainwater adds to the soil.

If your mixed fertilizers contain sulphur, you and your dealers can profit by bringing this fact to the attention of your farmer-customer. SULPHUR can be a SALES-MAKER for YOU!

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When you purchase your nitrogen requirements from Nitrogen Division, Allied Chemical, you have many different nitrogen solutions from which to select those best suited to your ammoniation methods and equipment. You are served by America's leading producer of the most complete line of nitrogen products on the market. You get formulation assistance and technical help on manufacturing problems from the Nitrogen Division technical service staff. You benefit from millions of tons of nitrogen experience and the enterprising research that originated and developed nitrogen solutions.

	CHEMICAL COMPOSITION %						PHYSICAL PROPERTIES		
	Total Nitrogen	Anhydrous Ammonia	Ammonium Nitrate	Urea	Water	Neutralizing Ammonia Per Unit of Total N (lbs.)	Approx. Sp. Grav. at 60°F	Approx. Vap. Press. at 104°F per Sq. In. Gauge	Approx. Temp. at Which Salt Begins to Crystallize °F
NITRANA®									
2	41.0	22.2	65.0	—	12.8	10.8	1.137	10	21
2M	44.0	23.8	69.8	—	6.4	10.8	1.147	18	15
3	41.0	26.3	55.5	—	18.2	12.8	1.079	17	-25
3M	44.0	28.0	60.0	—	12.0	12.7	1.083	25	-36
3MC	47.0	29.7	64.5	—	5.8	12.6	1.089	34	-30
4	37.0	16.6	66.8	—	16.6	8.9	1.184	1	56
4M	41.0	19.0	72.5	—	8.5	9.2	1.194	7	61
6	49.0	34.0	60.0	—	6.0	13.9	1.050	48	-52
7	45.0	25.3	69.2	—	5.5	11.2	1.134	22	1
URANA®									
6C	43.0	20.0	68.0	6.0	6.0	9.3	1.180	12	39
6M	44.0	22.0	66.0	6.0	6.0	10.0	1.158	17	14
10	44.4	24.5	56.0	10.0	9.5	11.0	1.114	22	-15
11	41.0	19.0	58.0	11.0	12.0	9.2	1.162	10	7
12	44.4	26.0	50.0	12.0	12.0	11.7	1.087	25	- 7
13	49.0	33.0	45.1	13.0	8.9	13.5	1.033	51	-17
15	44.0	28.0	40.0	15.0	17.0	12.7	1.052	29	1
U-A-S®									
A	45.4	36.8	—	32.5	30.7	16.2	0.932	57	16
B	45.3	30.6	—	43.1	26.3	13.5	0.978	48	46
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IS A SHUTDOWN CALLED FOR LACK OF WORK A LOCKOUT ?

DUE TO A STRIKE, WE CANNOT OBTAIN DELIVERIES AND WILL CLOSE UNTIL THE SITUATION CHANGES.
I'LL SEE IT'S POSTED.
WE'RE WILLING TO WORK !
OUR UNION AIN'T ON STRIKE!
IT'S AN ILLEGAL LOCKOUT.
CLOSED
JOE CAMPBELL
WE'VE BEEN LOCKED OUT OF OUR JOBS.
WE HAD NO WORK FOR THESE MEN.
ARBITRATOR'S DECISION
NOT WHEN WORK IS UNAVAILABLE AND NO DISPUTE EXISTS BETWEEN CONCERNED UNIONS AND EMPLOYER.
Based on a 1959 New York Decision

Six Helpful Tips for Bagging Department To Improve Sewing Machine Operations

By Arthur Nichols
Manager Sewing Machine Clinic Service
West Virginia Pulp & Paper Co.

NOT too long ago I visited a new plant equipped with the newest machines for sewing multiwall bags. As the foreman proudly showed me the operation, he remarked, "This is one of the most efficient operations of its kind in the country."

My answer came as a surprise to him. I said, "Yes, Joe, you have a very modern plant, 'but' I can see a number of things wrong with the adjustment of your sewing and conveying equipment, and the way they are being operated. If these things are corrected, your efficiency can be increased by at least 50%."

This is not an isolated case. Our experience over the years has shown that there is hardly a plant in the nation where the sewing machine operation cannot be greatly improved. As a matter of fact, by following a few simple rules, bag breakage and product losses totalling millions of dollars annually can be materially reduced.

Let us get down to a few specifics: It has been proved in the field that properly sewn bags will outperform bags improperly sewn by at least five to one. We also have discovered that a great majority of "bags are improperly sewn," causing a high percentage of bag breakage at the customer's operation.

Let us list some of the things that can happen when the sewing machine operation is not efficient.

1. Improper tension of thread.

   Result: Tight stitches, causing thread to cut into paper, thereby weakening the bag and causing it to rupture along the sewing line.

2. Improper number of stitches.

   Result: Too few stitches cause sifting or leakage of product. Too many stitches cause weakening of bag. The recommended stitch per inch is 3.0 to 3.5.

3. Slippage of "feed dog." This is caused by too little or too much pressure on the presser foot spring.

   Result: Too little pressure causes slippage of feed dog. Too much pressure forms a bind which interferes with proper feeding of bag. (A dull feed dog may react in a similar fashion.)

4. Improper timing between sewing head and conveyor belt.

   Result: Sewing line becomes uneven. This causes an unequal weight when bag is filled, increasing bag breakage.

5. Binding of tape (when tape is used).

   Result: Tape will bind in folding mechanism, causing digging of "feed dog" on tape, even though feed dog is sharp.

6. Dirty machines.

a) **Result:** Where lint deposits build up in grooves of feed dog, there is an undue strain between the feed dog and throat plate, causing unnecessary wear.

b) **Result:** Where there is an accumulation of lint and product around the moving parts, oil lines may plug, causing "freezing" and breakdown of equipment.

Since West Virginia organized its multiwall bag division about a year and a half ago, we have analyzed just about every kind of plant in the country which fills and closes bags.

Much to the happy discovery of most managements, solutions to these sewing machine problems, which are not self evident, are surprisingly simple, and the reduction in bag breakage and product loss surprisingly large.

It takes long experience, however, to be able to detect trouble spots, because many are not easily detected on the surface. Also, once a trouble area is spotted, the trick is to know just exactly what to do to overcome it.

A
Very
Merry
Holiday
Season to
All of You
Executives and
Supervisors and
Works Managers in
Pesticide and Plant
Food Production from
All
of
us
at
Croplife

REMEMBER TO ORDER
CHASE BAGS
There's None Better!

Stauffer Plant to Double Northern California Output

RICHMOND, Cal. — Stauffer Chemical Co. has begun construction of a new plant at Richmond, Cal., which is expected to double the firm's capacity to produce agricultural chemicals for the northern California market. It is scheduled to be in operation by February. The new plant will replace the company's present agricultural chemicals unit at Berkeley, Cal.

The expansion at Richmond was necessitated, according to Roger W. Gunder, vice president, Western operations, by the rapidly growing agricultural needs of northern California. The unit was located at Richmond so that it could be integrated with Stauffer's major Richmond plant which produces sulphuric acid and fertilizers, superphosphate and mixed fertilizers, he said.

The agricultural chemicals facility now under construction is designed to produce a broad range of both dry and liquid agricultural chemicals.

New Insecticide Plant Under Way in Arizona

GLENDALE, ARIZ. — A new insecticide plant is under construction at the Arizona Agro-Phosphate Co., in Glendale, Ariz., and is expected to be in operation about the first of the year.

The plant will produce cotton and vegetable dusts and sprays, and it will be the first time such chemicals will have been manufactured by this company, a division of the Wilbur-Ellis Co. Until now the firm has concentrated primarily on the manufacture of fertilizers, and the new facility is a recognition of the growth and development of agriculture in the state. Wilbur-Ellis has maintained insecticide producing plants in Seattle, Wash., and Fresno, Cal.

Among the types of chemicals to be produced will be DDT, toxaphene and eldrin.

Bob Allard has joined the company to help in the completion of the plant. He has spent the past two and a half years with the Pacific Agro-Chemical Co., in Seattle, and for ten years before that had been with Wilbur-Ellis. He is now assistant to Ray Laine, general manager of the Arizona firm, who will be manager also of the new plant.

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President of Fertilizer Firm Dies in Accident

SAN FRANCISCO—John D. Bradley, for many years president of the Bunker Hill Fertilizer Co., was killed Thanksgiving night in an auto accident. His wife was also killed in the head-on collision on a San Francisco freeway. The company had not yet appointed a successor to the president, but had announced that Emmett G. Solomon, vice president and director, would function as interim head of the company.

In a letter to stockholders of the firm, the board of directors said that Mr. Solomon had also been named chairman of the executive committee of the board. They also stated that Ross D. Leisk had been appointed to fill the vacancy on the executive committee caused by Mr. Bradley's death.

The late Mr. Bradley had succeeded his father, Frederick W. as president of Bunker Hill. The latter headed the firm from 1897 to 1933.

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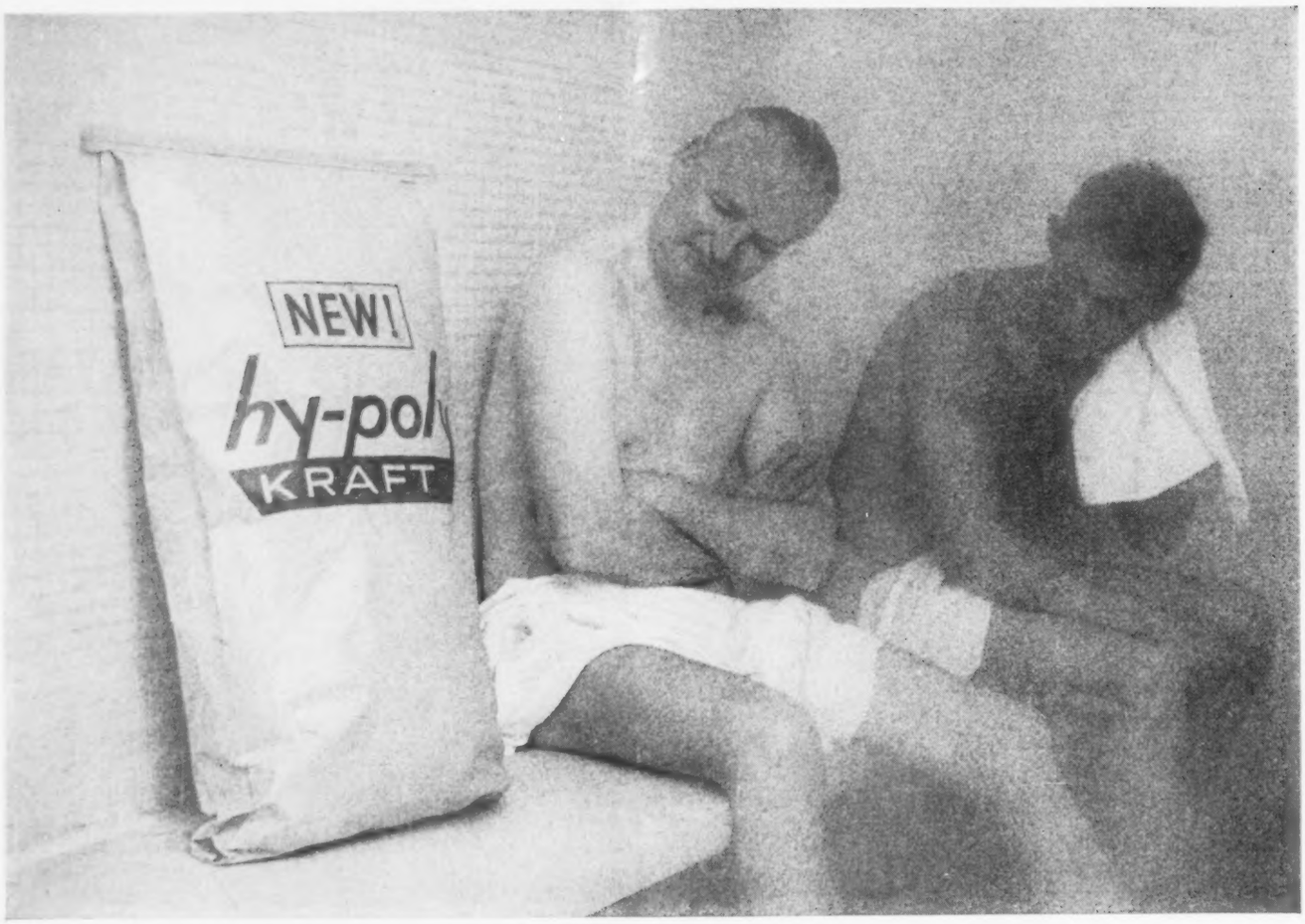

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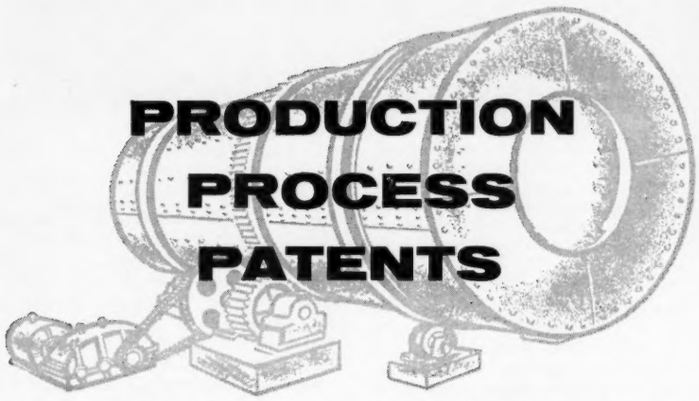


2,913,329

Process for the Manufacture of Complex Fertilizers. Patent issued Nov. 17, 1959, to Karl Geiersberger, Koln-Deutz, and Hugo Nees, Koln-Bruck, Germany, assignors to Chemische Fabrik Kalk G.m.b.H., Koln-Kalk, Germany. In the process for the production of complex fertilizers consisting in disintegrating raw phosphates with nitric acid (50-60%) together with sulphuric acid (70-98%), wherein for each 1 molecule of P_2O_5 present in the raw phosphate, 2 to 5 molecules HNO_3 and 2.5 to 1 molecule H_2SO_4 are used, subsequently ammoniating the reaction mixture at temperatures between 95 and 110° C. in a plurality of stirring vessels connected up in series, adding ammonium into the mixtures in said stirring vessels in such amounts that a pH-value in the range of 3.5 to 4 is maintained in the next to the last vessel, and a pH-value of 6.0 to 7.0 is maintained in the last vessel, and discharging the mixture from the next to the last vessel directly into the last vessel while maintaining the pH-value in the last vessel between 6.0 and 7.0 and thus abruptly raising the added mixture to the same pH.

2,913,330

Manufacture of Triple Superphosphate. Patent issued Nov. 17, 1959, to Joseph F. Wilson, Bartlesville, Okla., assignor to Phillips Petroleum Corp. A process for the continuous manufacture of triple superphosphate, comprising, in combination, the steps of pretreating phosphate rock with a first quantity of phosphoric acid, mixing the resultant pretreated rock with a second quantity of phosphoric acid, blending substantially all of the resulting solid green triple superphosphate with cured triple superphosphate fines, and drying and classifying the resulting blend, said first quantity of phosphoric acid being an amount within the range between 4 and 15 weight percent of the total phosphoric acid required and said second quantity of phosphoric acid being the balance of said total phosphoric acid required to bring the acidulation ratio up to the desired level.

2,913,493

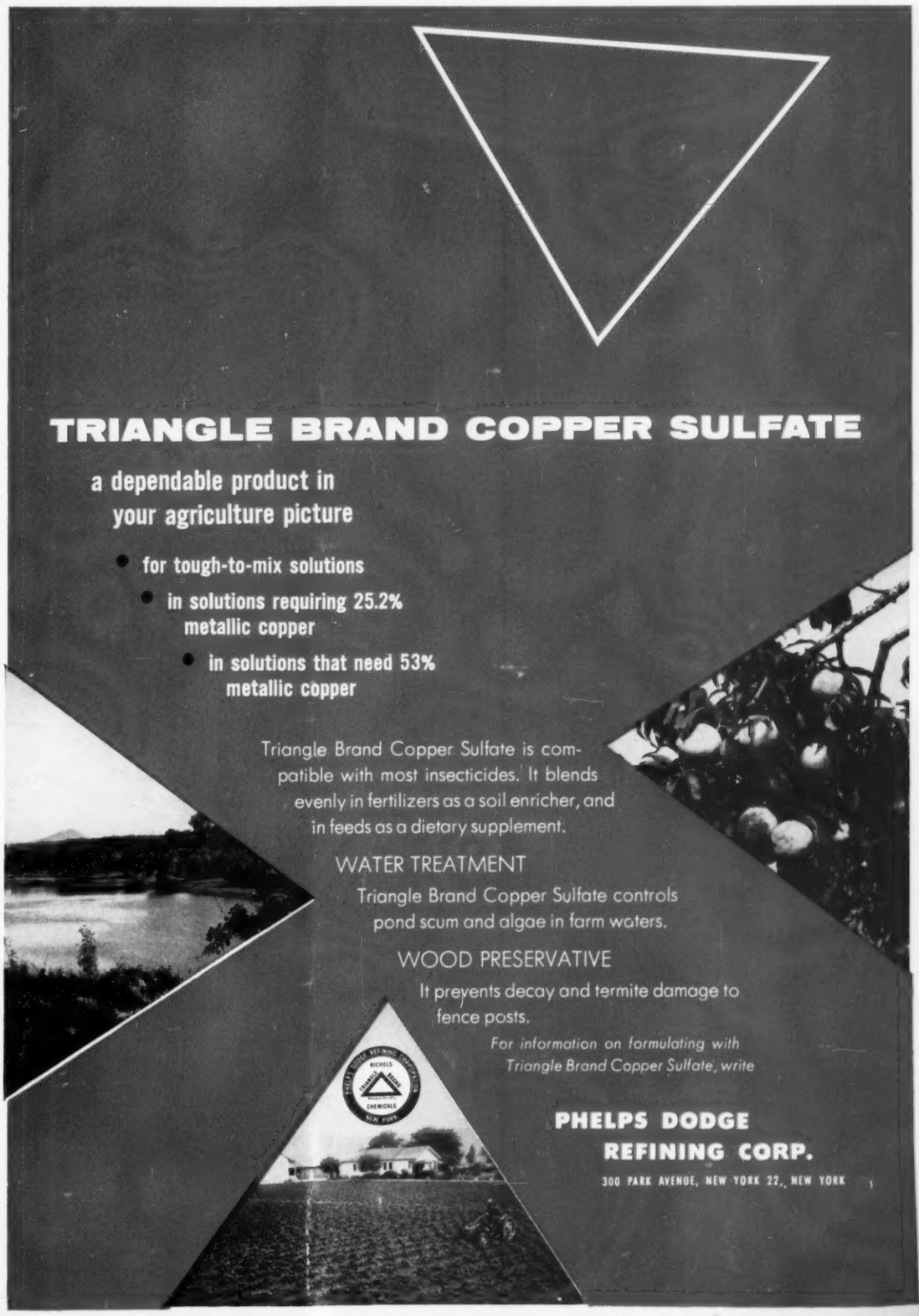
Urea Synthesis. Patent issued Nov. 17, 1959, to Morgan C. Sze, Garden City, and Hsioh Wu Wang, Freeport, N.Y., assignors to Hydrocarbon Research, Inc., New York.

In a process for synthesizing urea which comprises reacting ammonia and carbon dioxide at a temperature in the range of 340 to 390° F. and at a pressure in the range of 2700 to 4000 p.s.i.g. in the presence of recycled ammonium carbamate, withdrawing from the synthesis zone a reaction mixture consisting essentially of urea, water, ammonium carbamate and excess ammonia, removing the major portion of said excess ammonia from said reaction mixture by distillation, decomposing ammonium carbamate in the remaining mixture at a pressure in the range of 90 to 175 p.s.i.g. to separate therefrom a first gaseous fraction rich in ammonia and carbon dioxide and leave an aqueous urea-rich liquid fraction containing ammonia carbamate, and further decomposing ammonium carbamate in said urea-rich liquid fraction at a pressure in the range of 0 to 15 p.s.i.g. to separate therefrom a second gaseous fraction rich in ammonia and carbon dioxide and leave an aqueous solution of urea substantially free of ammonium carbamate, the improvement which comprises refluxing ammonia during the distillation of said reaction mixture so that said major portion of said excess ammonia is removed substantially free of water and carbon dioxide, liquefying the bulk of the removed ammonia, forming from said second gaseous fraction an ammoniacal ammonium carbamate solution containing the minimum quantity of water to prevent precipitation of ammonium carbamate, combining said ammonium carbamate solution, said first gaseous fraction and the liquefied ammonia removed from said reaction mixture with fresh feed liquid ammonia to provide a recycle feed comprising a slurry of ammonium carbamate in liquid ammonia, and introducing said recycle feed and fresh feed carbon dioxide as a gross feed into said synthesis zone for the aforesaid reaction of ammonia and carbon dioxide, said gross feed having a molar ratio of ammonia to carbon dioxide in the range of 6.5:1 to 9.0:1 and a molar ratio of water to carbon dioxide not exceeding 0.25:1.

2,916,354

Method of Producing Phosphates. Patent issued Dec. 8, 1959, to James W. Edwards, Kettering, Ohio, assignor to Monsanto Chemical Co., St. Louis, Mo. A low temperature method for making sodium tripolyphosphate containing a predominant portion of $Na_5P_3O_{10}$—I, which method comprises heating a mixture of sodium phosphates, other than sodium tripolyphosphate, having an overall molecular ratio of Na_2O to P_2O_5 between about 1.5 and about 1.8 and an overall molecular ratio of Na_2O to water of constitution of less than about 10, at a temperature between about 200° C. and about 470° C. until the mixture has been converted to a product which contains a predomi-

Turn to **PATENTS** page 27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Detailed Job Training a MUST for Efficiency

By John E. Smith
Spencer Chemical Co.
Kansas City, Mo.

JOB INSTRUCTION training for new employees in the plant is of unusual importance from the standpoints of both safety and efficiency in work of the new man. Actually, the job instruction need not be limited only to the new employee, but is a subject of importance to be reiterated to the man who has been on the job for some time, and may have become careless and indifferent.

There are scores of jobs around the fertilizer or pesticide manufacturing plant, each position having its peculiar hazards and requirements for safety knowledge.

In his talks before the recent series of regional fertilizer safety schools, John E. Smith, director of safety for Spencer Chemical Co., Kansas City, Mo., presented thoughtful instructions to men performing various jobs in the plant. These instructions included steps to be taken in the work, the key points where hazards may exist, and specific safety instructions for the employee to follow. The items cover hazards in the work area, in material handling, machines, tools, proper and improper clothing, and how to remove hazards, protect oneself, and learn safe methods of operating on the job.

Following are some of the instructions given by Mr. Smith for the operation of certain jobs giving first the description of the position, steps to observe in performing it, hazards to be expected, and safety instructions:

Drag Line Operator

STEPS—1. Drag line operator, on signal from helper, starts cable with scoop toward hopper or opening.

2. Operator releases cable and helper or machine drags scoop back to end of car or pile for next setting.

HAZARDS—If signal is not well understood or not loud enough to be heard by the operator, the misunderstanding may cause injury to helper.

2. Poor attention can cause scoop to hit helper or anyone else working in the car or on the pile.

SAFETY INSTRUCTION—1. Have signals clearly understood and know that they are to be heard.

2. Continuous concentration on the drag line at all times when in operation.

3. Always wear leather gloves when handling cables.

4. Never attempt to get near a moving drag line or its mechanism when it is in operation, especially when the cable winds on the drum.

Unloading Tank Cars

STEPS—1. In unloading tank cars of NH_3 solutions, nitric acid, sulfuric, phosphoric and other acids, use two trained, skilled men.

2. Block wheels, fix blue flags, work upwind.

3. Remove snow and ice, check for leaks.

4. Open valve covers carefully.

5. Remove plugs from valves, using two good wrenches.

6. Avoid straining valves.

7. Inspect hose, connections, and gaskets.

8. Use stainless fittings in good condition.

9. Use lubricant on threads.

10. Connect hose.

11. Apply minimum air pressure.

12. Open liquid valve slowly.

13. When empty:
Drain line into car.
Close all valves at car.
Slowly release product and pressure from hoses.
Disconnect hoses.
Remove pipe fittings, replace if necessary.
Close valve covers.
Remove wheel blocks and blue flag.

HAZARDS—1. Faulty connections weakened from corrosion, wear, cross threading.

2. Fumes, product on body.

3. Long pipes at car valves cause undue strains.

4. Hose failing or slipping off at fittings.

5. Hose weakened by kinks.

6. Excess pressures.

SAFETY INSTRUCTIONS—1. Use corrosion resistant metals of adequate strength.

2. Inspect threads and bodies of car valves and of fittings for weakness.

3. Make sure pipe plugs are secure in valves and valves closed.

4. Test for pressure by cautiously opening vapor valve, not the liquid valve.

5. Use nipples no longer than six inches.

6. Use heavy, bolted, stainless steel hose clamps four bolt.

7. Use ells to avoid kinks in hose.

8. Store hose to avoid kinks.

9. Note effect of heat on some synthetic hose.

10. Know pressure in car.

11. Gauges in high velocity pipe lines read too low while air gas is passing at high velocity.

Ammoniator

STEPS — 1. Mixer—ammoniator clean inside, flights in order.

2. Inspect distributor pipes.

3. Test pipes for flow.

4. Dry materials in mixer ahead of acid and nitrogen solution.

5. Make certain dry materials remain in mixer for mixing and ammoniating.

6. Where sulfuric acid is used, add

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potassium chloride after acid and ammonia, if practical, to avoid ammonium chloride fumes and possible fires and explosions.

7. If granulating, make certain of flow of recycle as safety may depend on this for bulk and temperature control.

HAZARDS—1. Explosions and fires.
2. Fumes — ammonia and ammonium chloride.

SAFETY INSTRUCTION — 1. Trouble frequently caused by poor distribution of acid and nitrogen solution, too little dry ingredients present, or poor mixing of all ingredients.
2. Keep distributor pipes in good condition.
3. Guard against failure of supply of dry ingredients.
4. Expecting too much from ingredients and equipment.
5. Equipment not adequate for normal demands.
6. Applying ammonia too fast.
7. Pelletizing starting before all ammonia is added.
8. Correct by using dryer ingredients or more recycle.
9. Ammonium chloride fumes from too much acid or contact acid with KCl.
10. Ammonia dripping into mixer.
11. Poor vent arrangement from measuring tank.

Granulator

STEPS—1. Check all normal safety provisions such as interlocks, location of all personnel before start.
2. Emergency water for men.
3. Fan on dryer running, full flow of air through dryer to carry off fumes and heat.
4. Start burner only after fan.
5. Have burner operating reliably.
6. Water flow before start of acid, ammonia flow.
7. Have mass of dry materials and some acid where used, in mixer before starting ammoniation.
8. All distributor pipes in good order.
9. All materials flowing.
10. Constant watch at points such as at ammoniator-mixer.

HAZARDS—1. Ammoniator-mixers. (Where the granulator is a separate device, there is little hazard other than those common to rotating heavy machinery.)
2. Fires and explosions, acid, nitrogen solution, steam, hot materials splashed on men.
3. Fumes.
4. Fires and fumes in dryer.
5. Gauge glass breakage.
6. Hose and pipe failures.

SAFETY INSTRUCTIONS—1. Distributor pipes good design, good condition.
2. Inspect daily.
3. Cut off acid and ammonia when dry feed fails. Use automatic interlock.
4. Watch for pronounced reduction of mass in mixer.
5. Use realistic formula.
6. Do not expect unreasonable performance of men, tools, equipment. Allow safety factor.
7. Keep recycle uniform.
8. In batch mixing, make sure dry ingredients with any recycle are in mixer before adding acid, and ammonia.
9. Ample air at all times through dryer.
10. Watch temperature of product and of air in dryer.
11. Avoid excess drying.
12. Poor product may result from excess storage temperature caused by excess drying.
13. Reduce heat proportionately as system is tapering off for shut-down.
14. Install guards, watch pressures, provide correct hose connections.
15. Do not hammer on meters.

Front End Shovel Operators

STEPS—1. Use only qualified tested drivers.
2. Set up a preventive maintenance program.
3. Make a complete safety check of the machine at the beginning of each shift.

HAZARDS—1. Poor brakes.
2. Improper inflation of tires.
3. Defective steering mechanisms.
4. Poor clutch.
5. Defective battery or poor installation.
6. Leaking or over-filled gasoline tank.
7. Non-operating horn.
8. Blind corners.
9. Slippery floors.
10. Undercutting fertilizer piles.

SAFETY INSTRUCTIONS—1. Always properly park the vehicle, block wheels, if necessary.
2. Never carry passengers anywhere on the vehicle.
3. Never let machine run idle in confined or semi-confined areas.
4. Check for fire extinguishers and know the operation.
5. Observe all speed limits.
6. Avoid quick, jerky stops, quick turns, and come to complete stop at blind corners.
7. Check dock plates for security before driving over them.
8. Look in direction of travel and have a clear view at all times.
9. Never undercut a pile too much. Don't take a chance on being covered up.

Unloading Boxcars

STEPS—1. Placement of boxcar.
2. Opening boxcar doors.
3. Placement of gang boards.
4. Removing car doors.
5. Coming out of boxcar.

HAZARDS—1. Placement of car near end of platform. Possibility of driving off platform.
2. Car doors are sometimes hard to open and possible to receive injury through strain or tool slip and get a severe cut. Open both doors.
3. Gang boards may not be secured against possibility of slipping out of place. The tractor could tip and throw operator off.
4. Car doors usually made of paper with metal strips. Gloves should be used to avoid cuts.
5. Working in boxcar and coming out in bright sunlight, possible to run down other personnel.

SAFETY INSTRUCTIONS — 1. If the car is not placed properly, either have it spotted correctly or do it yourself.
2. Use proper tools to open car doors. They stick and if employee is not careful, he can strain himself.
3. Each gang board contains bolt holes, make sure that the board will not slip out of place.
4. Car doors or grain doors can be very dangerous. Use gloves to pull them out of way and make sure the metal strips do not spring loose and strike on face or arms.

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Hi-Acres is a typical fertilizer mixing plant—typical in the large amount of bulk material handling that is needed and typical in that "PAYLOADER" tractor-shovels are "standard" for handling the bulk of such work.

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Kickapoo Fertilizer Co. Reorganizes Management

STEVENS POINT, WIS.—Management reorganization of Kickapoo Fertilizers, Stevens Point, Wis., has been completed with the new management acquiring three new properties as part of 1960 expansion plans.

R. B. Baldridge

R. B. Baldridge, executive vice president and general manager, said that general offices for the Midwestern Phosphate Corp. and the Midwestern Farm Fertilizers, Inc., had been moved to Stevens Point. The two firms operate under the "Kickapoo Fertilizer" tradename. General offices were formerly in Hillsboro, Wis.

The organization previously was headed by D. W. Aitken, Madison, who was killed in an accident vacationing in Colorado last summer.

Besides Mr. Baldridge, who also serves as secretary-treasurer, top management consists of Philip Q. Sawin, Madison, Wis., president, and A. D. Strobhar, Savannah, Ga., vice president.

Kickapoo has added 30% to production facilities at both Stevens Point and Hillsboro plants this year. Warehousing facilities are currently being installed in three other Wisconsin towns, Shiocton, Gratiot and Owen. Production facilities will be initiated at these sites in 1960, Mr. Baldridge added.

Kickapoo's board of directors consists of S. G. Kingston, president, Citizens National Bank, Stevens Point; Dr. Philip Sawin, also a partner in Counselling Associates Inc, Madison, and Mr. Baldridge who serves as vice president, Southern States Products Co., Savannah, Ga.

R. D. Tayloe Named to Smith-Douglass Position

NORFOLK, VA. — Smith-Douglass Co., Inc., has named R. D. Tayloe assistant to the fertilizer division production manager, it has been announced by Dale C. Kieffer, fertilizer production manager.

R. D. Tayloe

Mr. Tayloe is a chemical engineering graduate of Lehigh University. He has 19 years experience related to fertilizer production, most recently with the Freeport Sulphur Co., New York, N.Y. He has served as director of technical service for the National Potash Co., and prior to that was with the Davison Chemical Co. for 16 years, serving in various fertilizer production capacities. Mr. Tayloe is married and has three children. He and his family will live in Norfolk.

Kraft Offers Attachment To Add Pesticides to Plant Food in Bagging Process

NEW YORK — Kraft Bag Corp., exclusive sales agent for the Kraftpacker automatic open mouth bag filling machine, announces the development of two new Kraftpacker attachments—one to add and mix a desired amount of regular or pulverized insecticide or herbicide to each bag of fertilizer as it is being filled—the other to add liquid insecticide or herbicide to the fertilizer. The amounts of either type can be carefully controlled according to the requirements of the packager.

"Since effective adding and mixing of these materials to fertilizer have long presented a problem to fertilizer manufacturers, Kraft Bag Corp. views these attachments as a definite contribution to the fertilizer industry," a spokesman said.

Kraft Bag Corp. is a subsidiary of Gilman Paper Co., with plants at St. Marys, Georgia and Gilman, Vermont. Headquarters are in New York. The Western sales office is in Chicago.

Joins Hudson Sales Force

NEW YORK—Robert Knight has been made district manager for Hudson Pulp & Paper Corp. multiwall division, for Western Missouri, Kansas and Eastern Nebraska. The announcement was made by B. C. Drumm, sales manager.

Mr. Knight will make his headquarters in Kansas City. He has had extensive sales experience in the multiwall bag industry since his graduation from Oklahoma A&M college where he was a member of the football team.

Fertilizer, Mineral Tax Studied in California

SACRAMENTO — The California Senate Interim Committee on Agriculture at its Dec. 1 meeting here heard testimony from Department of Agriculture representatives that the administrative and enforcement costs of the tonnage tax on fertilizer and agricultural minerals exceed revenue.

At the present time the tonnage tax for fertilizer is 15¢ and for agricultural minerals 3¢.

While all persons concerned express the desire to increase revenue sufficiently to avoid an annual deficit and a diminishing reserve fund, there was a conflict of ideas on how it should be done.

The California Department of Agriculture and Department of Finance were joined by the California Fertilizer Assn. in suggesting a tonnage tax of 20¢ for commercial fertilizer and 6¢ for agricultural minerals. An agricultural mineral representative argued for continuing the 3¢ per ton levy on minerals and substantially increasing the tax on fertilizer. This, he contended, was justified because of the ratio of retail prices of the two products.

It was estimated that the reserve fund, without adjustment of revenue, would carry the act to 1961, the first year in which the problem can be considered by the legislature unless a special session is called on the subject during the Budget Session in March, 1960.

Superintendent Dies

HOPEWELL, VA. — Stewart G. McKenzie, 57, general superintendent of the Hopewell plant of Nitrogen Division, Allied Chemical Corp., died recently of a heart attack. He had been with the firm a number of years.

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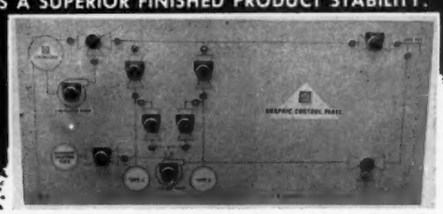
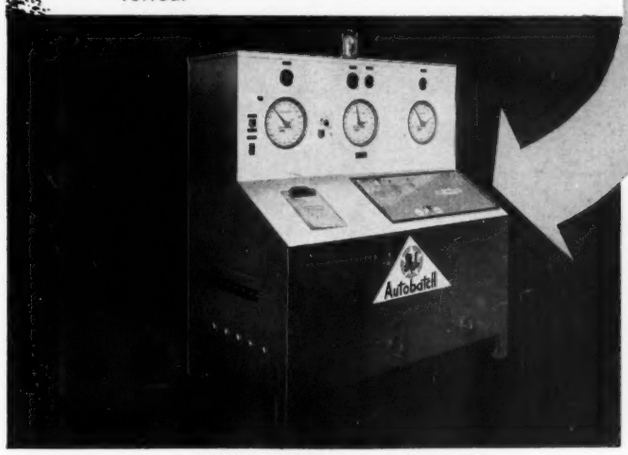


GRAPHIC CONTROL PANEL

Furnished as standard equipment on the B&L Autobatch line and provides remote control and operation of various components together with visual indication of the sequence involved.



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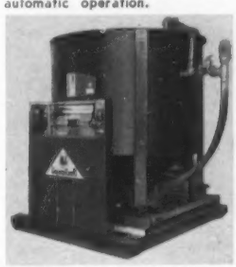


THE B&L LiqualizeR. Standard or scale mounted models. Exclusive "whirlpool" action, positive total solubilization for trace elements, insecticides, herbicides, etc.

THE B&L AutobatcH SKID PLANT
Ultimate in batch-type "complete package" units. Features the fully automatic continuous acid neutralization process.

THE B&L CoactoR. High capacity continuous flow neutral solution liquid fertilizer processing unit. Provides a complete installation at low investment.

THE B&L ConvertoR
Automatic or manually controlled liquid nitrogen, "package units" for converting anhydrous ammonia to aqua ammonia.

What's New?

Additional information is available about new products, new services, and literature described in this department. Circle the numbers of items on which you desire more information, fill in your name, your job title, your company's name and address on the card. Then clip it out of the page and mail. No postage is necessary.

No. 9157—Booklet on Cationic Chemicals

Publication of a booklet on cationic chemicals as conditioners for hygroscopic salts and fertilizers has been announced by the Armour Industrial Chemical Co. The booklet covers nine Armour chemicals and formulations

used for conditioning fertilizers and salts, gives methods of application and recommended uses. Examples of the effects of conditioners on various single minerals and fertilizer blends are shown graphically. In addition, flow diagrams depict application of reagents under pilot plant conditions. Results of tests and full-scale plant operations with granulated and pelletized fertilizers are included. For copies of the booklet, check No. 9157 on the coupon and mail.

No. 9165—Surfactant Data

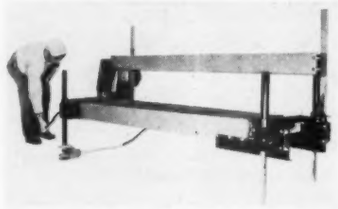
A 44-page booklet, describing the properties and uses of Tergitol surfactants, has been published by Union Carbide Chemicals Co., division of Union Carbide Corp. The booklet contains data for eight nonionic and four anionic Tergitol surfactants, including selection, solubilities, properties, formulations, applications, performances, specifications and test methods, shipping, bulk storage and physiological properties. A detailed bibliography and reference section is included. For copies of the publication, check No. 9165 on the coupon and drop in the mail.

No. 9166—Nitrogen Solutions Booklet

Commercial Solvents Corp. announces the availability of a booklet called "Dixsol Nitrogen Solutions." The illustrated booklet contains sections on nitrogen, types and uses of nitrogen solutions, ammoniation of superphosphates, ammoniation practice, granulation, formulation, storage of finished fertilizer and others. First aid measures and reference tables are also included. To obtain a copy, check No. 9166 on the coupon and mail to this publication.

No. 9158—Flat Belt Conveyor

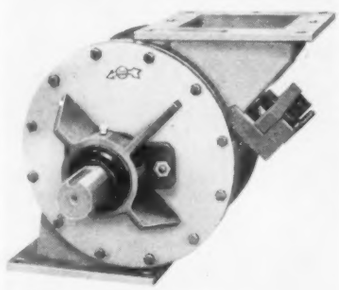
A flat belt conveyor which can be adjusted in height as well as in length has been announced by Richardson Scale Co. An adaptation of the Model GA-11 bag conveyor which allows changes in length from 7 to 12 ft., the unit's standard height of 8 in. can be jacked by one operator to any



position within a range of 12 in. The conveyor is designed for all package conveying, and in particular to convey filled bags from weighing and packing equipment through a sewing operation. The surface of the belt is absolutely flat, the company says, because the belt rides on flat metal skid plates. All sizes of bags can be conveyed. For further information, check No. 9158 on the coupon and mail.

No. 9159—Air Lock Feeder

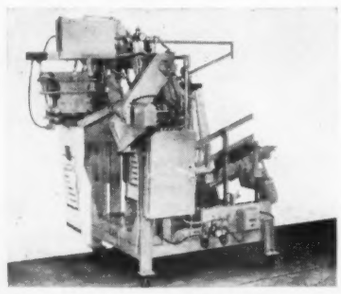
The Young Machinery Co., Inc., announces a non-jamming, side entry rotary air lock feeder for handling free-flowing cubes, pellets, chips, flakes, prills and other material. Features of construction eliminate the need for adjustable or flexible tips, the company says, and the unit is



guaranteed not to crush or grind friable materials. All units are furnished with packing gland seals and outboard anti-friction bearings. Standard units are available in sizes 2, 2½, 3, 4, 5, 6, 8, 10, 12, 14, 16, and 18. It is furnished also as a blow-through unit in sizes 4, 5, 6, 8, 10, 12, and 14. Both units are manufactured in carbon steel, type 304 stainless steel, type 316 stainless steel, Inconel, Monel and nickel. For more information, check No. 9159 on the coupon and mail.

No. 9160—Automatic Bag Hanger

An automatic bag hanger which supplies empty open-mouth multiwall bags to a filling machine and places them on the loading spout has been announced by Union Bag-Camp Paper



Corp. Adaptable to all Union I & C bagger models, the auxiliary machine eliminates the need for a bag filling operator, the company says. By utilizing both vertical and horizontal adjustments, the machine can handle a broad range of bag sizes in either gusset or tube type. The controls of the bag hanger are interlocked with those of the automatic bag filling machine. This prevents the empty bag from moving to the loading spout until the filled bag is released. For details, check No. 9160 on the coupon and mail.

No. 9162—Disposable Outerwear

Plasco Safety Products Co. announces a line of plastic disposable outerwear which the company says will give head to toe protection to

employees. Items include wrist, elbow and shoulder-length sleeves, various sizes of aprons and shoe covers which range from ankle length to knee length. Illustrated circulars, price quotations and samples for testing are available upon request. Check No. 9162 on the coupon and mail.

No. 9163—Single Pad Lift

Vac-U-Lift Co., division of the Siegler Corp., announces a self-contained Pad Pac unit. According to the company, the single pad unit is designed for efficient handling of metal drums, stone, concrete, sheet and plate steel and other nonporous materials. The unit is approximately 18

in. high and is equipped with a 16 in. diameter pad and neoprene seal ring with a lifting capacity of 1,200 lb. in horizontal lift and 600 lb. lift in shear position. Other company pads can be attached to the Pad Pac by unscrewing the pad from the base of the unit and replacing with a pad of the desired size and lifting capacity. For more information, check No. 9163 on the coupon and mail.

No. 9161—Jet Mill

Engineered Materials has been appointed exclusive sales agent for Trost Jet Mills. The fluid energy mills are built on the principle that the particles to be ground collide against themselves with high impact velocities of

Send me information on the items marked:

- ☐ No. 9152—Automatic Bag Hanger
- ☐ No. 9153—Material Handling Pallet
- ☐ No. 9155—Mental Ability Test
- ☐ No. 9157—Booklet on Cationic Chemicals
- ☐ No. 9158—Flat Belt Conveyor
- ☐ No. 9159—Air Lock Feeder
- ☐ No. 9160—Automatic Bag Hanger
- ☐ No. 9161—Jet Mill
- ☐ No. 9162—Disposable Outerwear
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- ☐ No. 9166—Nitrogen Solutions Booklet
- ☐ No. 9167—New Drier

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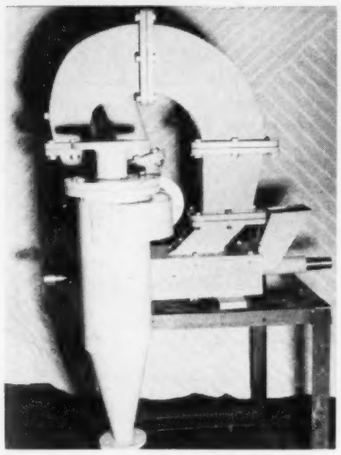
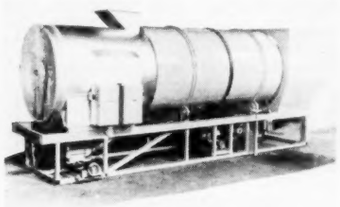
up to 1,000 ft. per second or higher. According to the company, the Trost jet mills can eliminate contamination of materials from abrasion of the walls of the grinding and collecting chambers, by use of proper linings.



The parts subject to the most abrasive action can be made of alloy steels, silicon, tungsten, boron carbide, ceramics, rubber or other materials. The mill has ground materials such as titanium boride to 80% below one micron, the company says. For more information, check No. 9161 on the coupon and mail.

No. 9167—New Drier

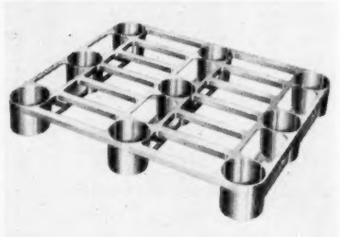
Finco, Inc., announces a drier designed to remove moisture from fertilizers, farm crops, chemicals, charcoal, seed, feed, pellets and other products. The heat source can be either electrical or steam, depending upon availability or choice. Temperature



controls permit all types of heat ranges. The revolving cylinder caused the product to be dried, to fall uniformly through a curtain of air, the company says. The variable air flow volume from 4,000 to 30,000 CFM, combined with variable speed control of the revolving cylinder, permits the unit to be specially set to handle a wide range of capacities, the company says, as well as different types of material requiring specific drying temperatures. For details, check No. 9167 and mail.

No. 9153—Material Handling Pallet

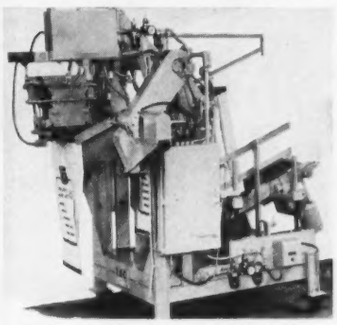
Mag-Craft Corp. has announced production of a magnesium material handling pallet. Considerable weight reduction and increased load capacities, in addition to better handling ease, are features, the company says.



Other features, according to company literature, include consistent weight and size, reduced load damage, four way entry, ease of storage and personnel safety. The pallet is available in a variety of sizes. For details, check No. 9153 on the coupon and mail.

No. 9152—Automatic Bag Hanger

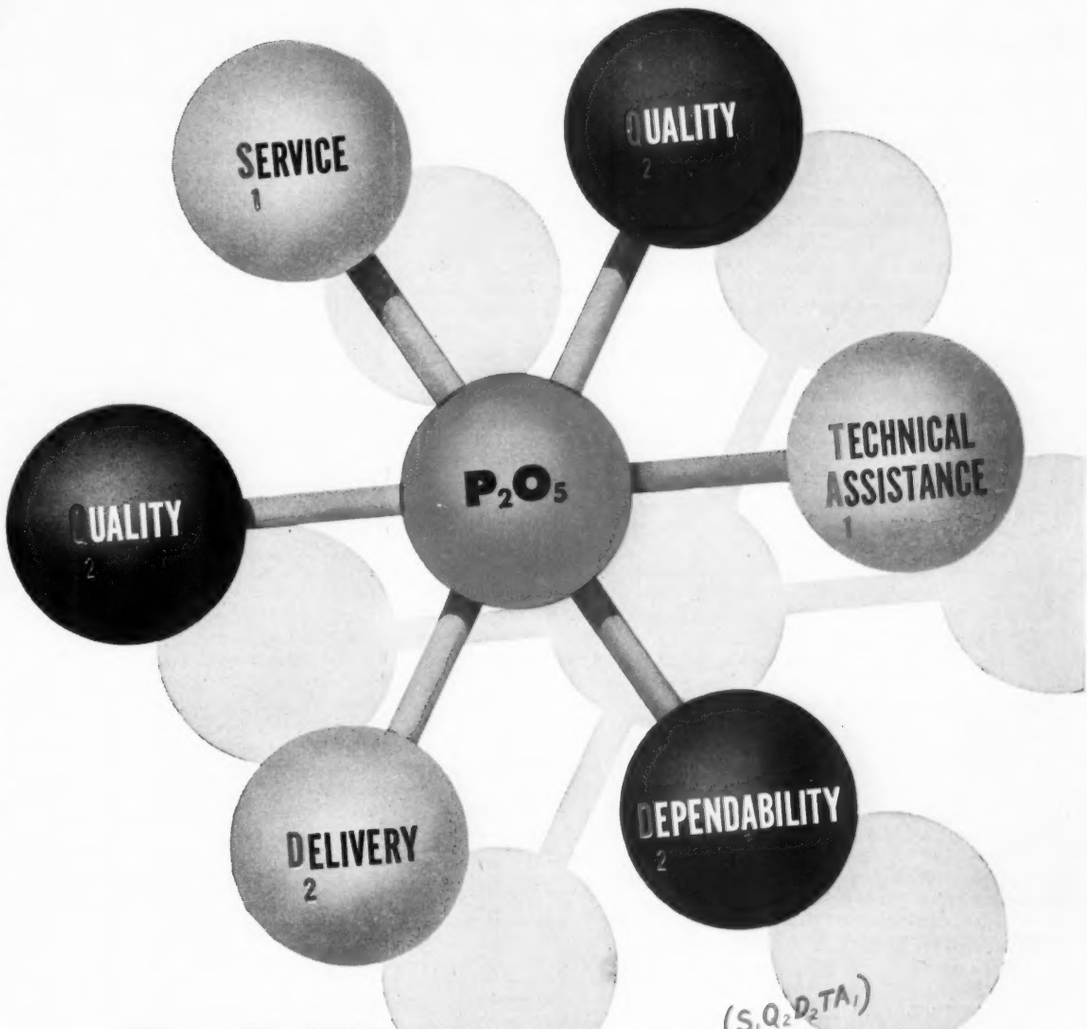
An automatic bag hanger which supplies open-mouth multiwall bags to a filling machine and places them on the loading spout has been announced by Union Bag-Camp Paper Corp. Adaptable to all Union I & C Bagger models, the auxiliary machine eliminates the need for a bag filling operator, the company says. By utilizing both vertical and horizontal adjustments, the machine can handle a large range of bag sizes in either gusset or tube type. To operate, any quantity up to 400 bags is placed upright in the bag magazine with the thumb notches forward. Sensing switches at both top and bottom of the leading bag keep it in position to be removed. The bags are moved forward at the top by pressure from a "follower" and on either side by elongated sprockets. A "picker" opens the bag in the magazine by using the thumb notch. Arms approach the bag, allowing the fingers mounted on the arms to move inside the bag. Pres-



sure is applied to move the bag out of the magazine. Controls are interlocked with those of the bag filling machine. This prevents the empty bag from moving to the loading spout until the filled bag is released. The interlocking of controls results in a range of speeds, governed by the bagger, up to 25 bags a minute. For more information, check No. 9152 on the coupon and mail.

No. 9155—Mental Ability Test

A general mental ability test, designed to give personnel administrators a quick, economical and scientifically reliable indication of mental ability as an aid in hiring, placing and promotion, has been announced by Aptitests. The test is part of a series of eight Aptitests which measure intelligence, personality traits and specific job aptitudes and abilities. The test is a relatively short-time test. Complete information on the general mental ability test, and on the series of Aptitests is available by checking No. 9155 on the coupon and mailing to this publication.



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Hi-Flo Blend-Phos Triple Superphosphate...45/46% available P_2O_5.

Granulated Normal Superphosphate...guaranteed 20% available P_2O_5.

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PRODUCTION EDITION

Editorial

Uniform Particle Size and Composition Essential in Making Profitable Product

PRACTICALLY ALL fertilizer manufacturers bend every effort to produce a uniform product, up to analysis, yet not overformulated to the extent of being uneconomic. It is embarrassing to see a company's name under the "deficient" column in state reports, but it is equally costly to add extra pounds of plant food to every ton just to be sure the product will pass state inspection.

In his talk at the Conference on Chemical Control Problems in Washington recently, Dr. F. W. Quackenbush, Indiana State Chemist, pointed out some factors involved in this problem, from the standpoints of both the control official and the fertilizer manufacturer.

Dr. Quackenbush described the "tolerance tables" adopted by control chemists in their analyses, and used a 12-12-12 grade as the point of discussion. He explained that some variables are inevitable, such as differences in techniques of sampling and analysis, and these are taken into consideration by applying a tolerance of .22% on products containing 12% nitrogen.

"On a large number of inspections, we can expect to be wrong only once in 100 times in calling a fertilizer deficient when our average analysis is below 11.78% (12.00% less .22% tolerance) and the product has a true nitrogen content of 12%," he said.

The condition of the fertilizer product has much to do with the accuracy of the analysis, the official pointed out. A product that is homogeneous, each particle having essentially the same composition as every other particle, presents no sampling problem. A representative sample may be obtained with any type of trier, tin cup or spatula from any place in the lot. Obviously, if such a product were manufactured generally, most of the problems of sampling would be overcome. There could be no segregation, even in bulk piles.

However, even under such optimum conditions, the official declared, all the chemical analyses made from such a lot would not necessarily fall on the exact 12% mark. "One analysis in every 100 would fall below the 11.78% line," Dr. Quackenbush said. Why? These are inspection errors, he explained. "It is these which we have measured and which provide the basis for tolerance figures. They provide a tolerance for inspection errors only and not for any deficiency in the actual composition or true value of the fertilizer."

What then, can a fertilizer manufacturer do to assure that his products will not be found deficient? If he formulates to exactly 12% nitrogen, he will attain about 99% perfection. This could be improved upon by formulating to 12.08% N (adding one-third of the tolerance) which would bring a 99.9% record. Such would give a manufacturer a perfect record in most years.

But there is a catch. Dr. Quackenbush is speaking of a completely homogeneous product. A fertilizer product of heterogeneous makeup introduces new sources of variation.

Under conditions imposed by a heterogeneous product, even if the fertilizer contained on the average exactly 12%, results of analytical tests may vary considerably beyond the tolerance level. The number of values above the 12% line will be the same as the number below it, but an additional large number will fall below the 11.78% tolerance line.

"This does not mean that our work is any less carefully done," Dr. Quackenbush explained. "It means that lack of uniformity of the product has introduced errors which reasonable tolerance figures cannot cope with. To overcome this, you must overformulate if you want a good record of meeting your guarantees. The amount of overformulation necessary is proportional to the lack of uniformity. In many cases, a formulation of 13% would be necessary. At some point, however, the cost becomes prohibitive."

Particle size and particle composition are the problem twins in the picture. They have at least four variations: they can be all of the same size and the same composition; they can have different sizes but the same composition; they can be of the same size but be of different composition; they can have both different size and different composition.

The first two conditions present no particular sampling nor analytical problems, but the latter two do; particularly the situation where particles have both different size and different composition. Dr. Quackenbush likened such products as mixtures of baseballs and grains of wheat. These differ in volume by a thousand-fold. "Imagine the difficulty of preparing a homogeneous mixture of these items and the further difficulty of designing an instrument to obtain a representative sample, even from a homogeneous mixture of the two."

The following table shows results of tests on products of six manufacturers of 12-12-12: lizers:

Company	Total Samples	% Passed	Average of all Samples: N	Phos.	Pot.	Uniformity
A	52	73	12.4	12.9	13.0	Poor
B	120	87	12.0	13.1	12.6	Good
C	63	86	11.9	12.9	12.7	Excellent
D	41	44	11.8	13.0	12.4	Fair
E	19	26	11.4	13.0	13.0	Fair
F	18	39	11.4	13.2	12.5	Poor

Company A gave away on the average .4% nitrogen; yet, because of poor uniformity of its product, only 73% of its samples passed. Company B gave away no nitrogen, yet its record was 87% passed. Company C hardly met the guarantee on average, yet because of the excellent uniformity of its product, operated within tolerance on 86% of its samples. Company D operated right at the tolerance line and, as would be expected, only about half of its samples passed. Company F, with a much lower average nitrogen, had nearly as high a percentage within tolerance, and this reflects also a lack of uniformity. Some of its samples were exceedingly deficient.

These data offer a real challenge to fertilizer manufacturers to improve the uniformity of products.

"Lack of uniformity is the root of all of our problems in segregation and sampling. I do not believe it is possible to design instruments which will adequately sample products which seriously lack uniformity of particle size and composition. The company which makes the most uniform product is likely to have both the highest percentage of samples within tolerance and also the highest percentage of profit."

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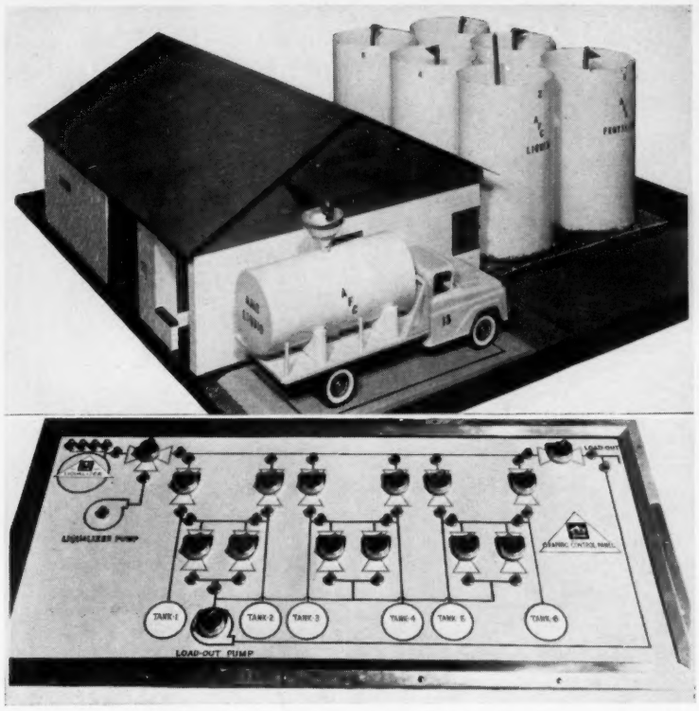
Associated Publications—The Northwestern Miller, The American Baker, Farm Store Merchandising, Feedstuffs, Milling Production, Feedlot, and Professional Nursing Home.



MINIATURE PLANT—The automation of a liquid fertilizer processing plant is shown dramatically in this working model prepared by Barnard & Leas Mfg. Co., Inc., Cedar Rapids, Iowa, for use as a display at meetings. Although the tanks and building (above) occupy space only a little more than a yard wide, the control panel (below) is an actual one used with the firm's equipment for formulation of complete analysis liquid fertilizers. Although the model does not produce actual fertilizer, it does attract attention at industry gatherings such as the recent convention of the National Fertilizer Solutions Assn. in St. Louis. Visitors can operate the control panel, routing liquids to and from tanks or into the waiting truck as one would in a real plant.

Industry Meetings

Jan. 5-6—Annual Texas Fertilizer Conference, College Station, Texas.

Jan. 6-7—Wisconsin Pesticide Conference with Industry, Wisconsin Center Bldg., University of Wisconsin, Madison.

Jan. 6-8—14th annual meeting, Northeastern Weed Control Conference, Hotel New Yorker, New York City.

Jan. 7-8—Colorado Fertilizer Conference, Ft. Collins, Col.

Jan. 12-13—Nebraska Fertilizer Institute annual convention, Pershing Auditorium, Lincoln, Neb.

Jan. 12-13—Thirteenth Annual Meeting of the Ohio Pesticide Institute, Lincoln Lodge, Columbus, Ohio.

Jan. 13—New Mexico Agricultural Chemical Conference, third annual meeting, Milton Hall, New Mexico State University, University Park, N.M., Dr. J. Gordon Watts, chairman.

Jan. 13-14—Pesticide School, North Carolina State College, Raleigh, N.C.

Jan. 13-15—Ninth annual convention, Agricultural Ammonia Institute, Statler Hilton Hotel, Dallas, Texas.

Jan. 19-21—Twelfth Annual California Weed Conference, Sacramento, Cal.

Jan. 20-21—Third Annual Arizona Fertilizer Conference, University of Arizona campus, Tucson, Ariz.

Jan. 20-21—Northwest Agricultural Chemical Industry Conference, Benson Hotel, Portland, Ore. C. O. Barnard, executive secretary.

Jan. 20-22—Thirteenth annual Southern Weed Conference, Buena Vista Hotel, Biloxi, Miss.

Jan. 25-26—Second annual Agricultural Pesticide Conference, Purdue University, Lafayette, Ind.

Jan. 28-29—Annual meeting of the Colorado Agricultural Chemicals Assn., Cosmopolitan Hotel, Denver, Colo.

Feb. 3-4—Illinois annual fertilizer industry conference, University of Illinois, Urbana.

Feb. 4—Executive Committee Meeting, Fertilizer Section, National Safety Council, New Florida Hotel, Lakeland, Fla.

Feb. 9-11—Seventh annual Agricultural Chemicals Conference, Texas Technological College, Lubbock, Texas.

Feb. 11-12—Midwest Agronomists-Fertilizer Industry meeting, Edgewater Beach Hotel, Chicago, Ill.

Feb. 12—California Ammonia Meeting, Hacienda Hotel, Fresno, Cal.

Feb. 22-25—Weed Society of America meeting, in conjunction with Western Weed Conference, Cosmopolitan Hotel, Denver, Colo.

March 22-23—Western Agricultural Chemicals Assn., spring meeting, Miramar Hotel, Santa Barbara, Cal.

June 13-18—National Plant Food Institute annual meeting, Greenbrier Hotel, White Sulphur Springs, W. Va.

July 13-15—Eleventh annual Fertilizer Conference of the Pacific Northwest, Hotel Utah, Salt Lake City. B. R. Bertramson, State College of Washington, Pullman, Wash., chairman.

July 27-29—Great Plains Agricultural Council, 1960 meeting, Laramie, Wyo.

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INVENTORY

Continued from page 12

Once adopted LIFO must be continued unless the commissioner requests a change or you apply for and are granted authority to change.

QUESTION: Are there any inventory practices that may cause trouble for a fertilizer plant?

ANSWER: Yes. In Section 29.22 of the Internal Revenue Code, these things are specifically listed as wrong:

1. Deducting a reserve for price changes or depreciation allowance.
2. Using a nominal value for goods in process rather than a proper value.
3. Failing to include part of the inventory.
4. Using a constant value for inventory without a physical count.
5. Counting stock in transit when you do not have title.

QUESTION: How can a fertilizer plant save time and money in taking a physical inventory?

ANSWER: Here are some suggestions fertilizer plant managements have found helpful in reducing the time for taking inventory and keeping costs at a minimum:

1. Plan the inventory well in advance.
2. Make a map of the fertilizer plant to be sure everything is counted —and not counted twice.
3. Organize stock for quick, easy and accurate counting.
4. Select, assign and instruct employees for inventory.
5. Provide control of listing sheets to avoid omitting part of inventory or taking some parts twice.
6. Spot check during the physical count to be sure it is accurate.

PATENTS

Continued from page 19

nant proportion of $Na_4P_2O_{10}$—I and which will exhibit a temperature rise of at least about 18.5° C. in the standard temperature rise test, and then cooling to below about 150° C.

2,916,371

Temperature Control Process for Making Urea Formaldehyde Fertilizer Compositions. Patent issued Dec. 8, 1959, to James M. O'Donnell, Woonsocket, R.I. A method for the production of solid urea-form fertilizer compositions from an alkaline liquid mix of urea-formaldehyde wherein the mol ratio of urea:formaldehyde is >1 which comprises acidifying said mix to a pH value of from about 2.0 to 4.0 to catalyze polymerization and immediately introducing said acidified liquid mix onto a continuous elongated moving surface to promote the formation of a urea-formaldehyde polymer layer not greater than about one half inch thickness, maintaining the temperature of said polymer layer between 40° and 58° C. on said surface during reation, removing said layer from said moving surface, neutralizing said removed layer, and drying said neutralized layer.

2,916,372

Production of Phosphate Fertilizers Soluble in Citric Acid. Patent issued Dec. 8, 1959, to Franz Schytil, Frankfurt, Germany, assignor to Lurgi Gesellschaft fur Chemie und Huttenwessen m.b.H., Frankfurt am Main, Germany. In a process for the production of citric acid soluble phosphatic fertilizers by calcinating raw apatitic phosphate under a steam containing atmosphere at temperatures of at least 1350° C., the steps which comprise admixing 4 to 8% of soda with the raw phosphate and also admixing with such raw phosphate a quantity of silica to provide a silica content between 5 and 15% based on said raw phosphate, granulating the raw phosphate, silica and soda mixture to form granules of a substantially uniform grain size not varying over 1 mm. and shape, the grain size being at least 3 mm. in diameter up to 8 mm. in diameter and calcining the granulated product of uniform grain size and shape under an atmosphere containing steam at temperatures of at least 1350° C.

2,914,573

Dehydrohalogenation of Benzene Hexachloride. Patent issued Nov. 24, 1959, to George McCoy, Philadelphia, Charles E. Inman, Roslyn, and Glendon D. Kyker, Glenside, Pa., assignors to Pennsalt Chemicals Corp., Philadelphia. The process of making trichlorobenzene from benzene hexachloride comprising contacting benzene hexachloride at a temperature of 190 to 300° C. with activated carbon.

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Rates: 15¢ per word; minimum charge $2.25. Situations wanted, 10¢ a word; $1.50 minimum. Count six words of signature, whether for direct reply or keyed care this office. If advertisement is keyed, care of this office, 20¢ per insertion additional charged for forwarding replies. Commercial advertising not accepted in classified advertising department. Display advertising accepted for insertion at minimum rate of $11 per column inch.

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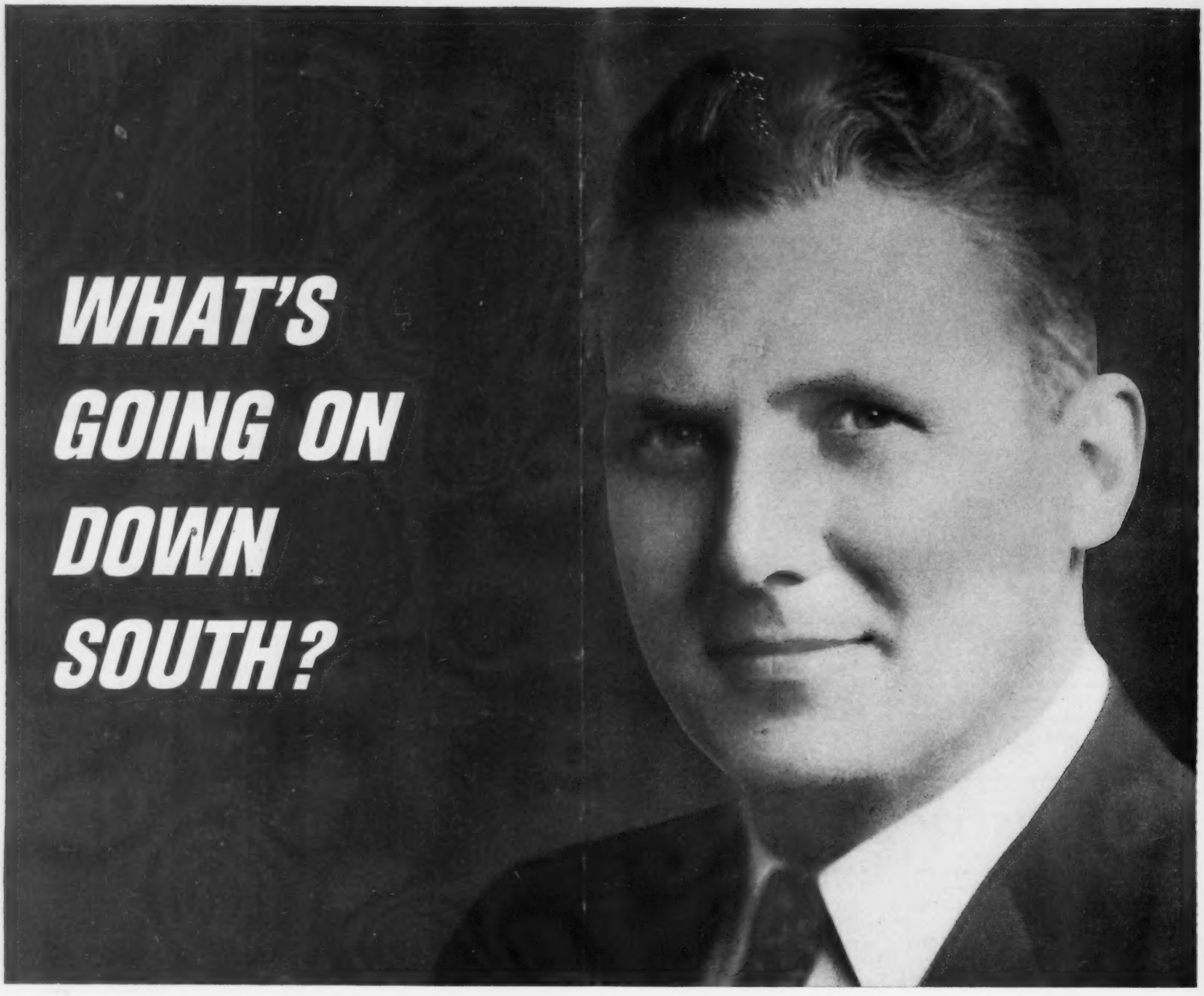

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Burton F. Bowman, *Marketing Director*
Agricultural Division, American Cyanamid Company

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